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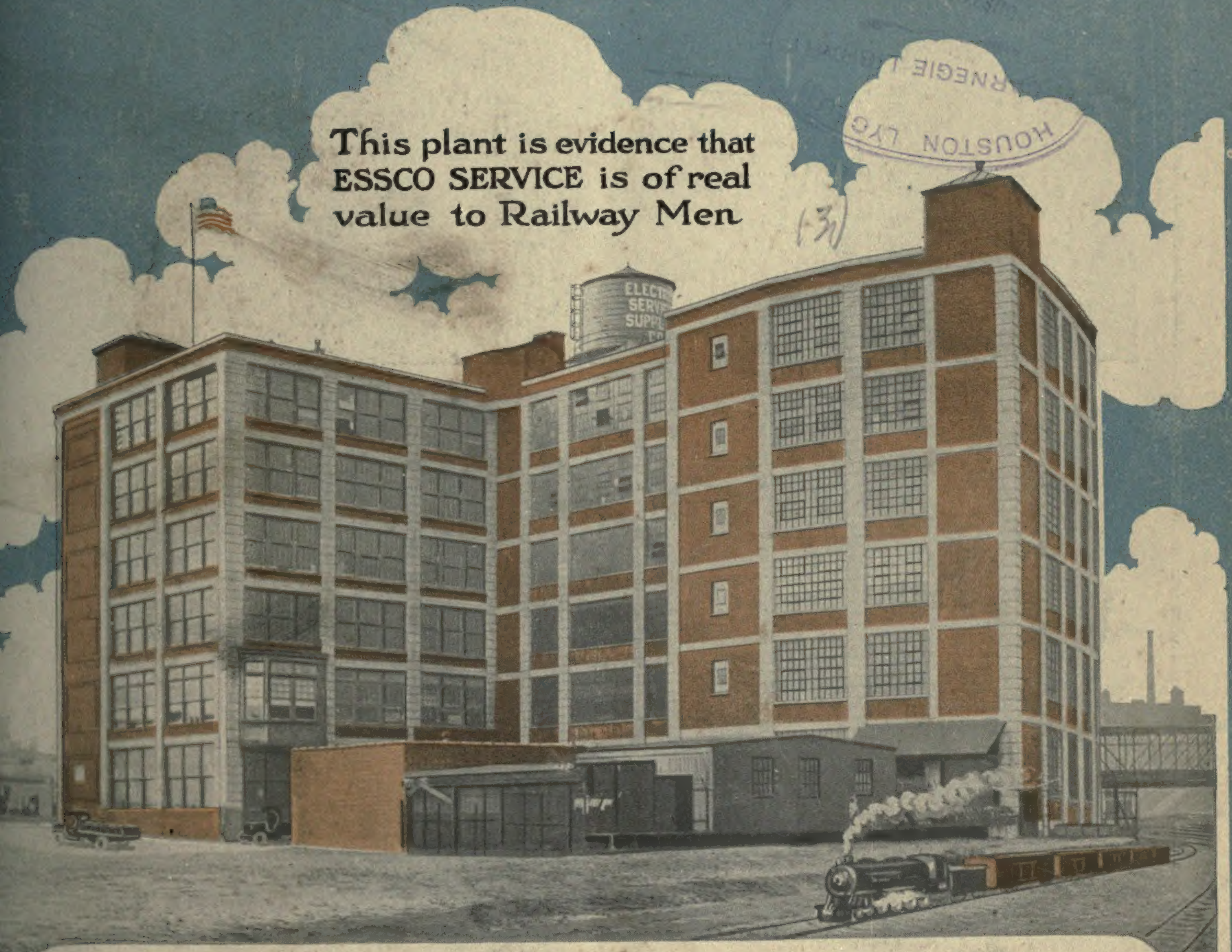
ELECTRIC RAILWAY JOURNAL


This plant is evidence that
ESSCO SERVICE is of real
value to Railway Men
ELECTRIC SERVICE SUPPLIES CO.

ESSCO SERVICE is backed by a plant in which numerous lines of Keystone car specialties, line and track equipment have for years been designed and manufactured. A plant in which research and development work is continually carried on to provide material which will help to solve the problems confronting you.

This entire organization is almost "back to normal conditions." SERVICE now means very prompt deliveries on practically everything you may need.

ELECTRIC SERVICE SUPPLIES CO.
PHILADELPHIA NEW YORK CHICAGO

Freight Haulage The Community Booster

"Transportation, Joe," said the Vice President "in all its phases is the business of the electric railways. Therefore, it is just as much our duty to give the community we serve the advantages of an efficient freight service, as it is to supply them with adequate passenger facilities. I am glad your preparations are advancing so rapidly."

"Yes, Boss," replied the Superintendent of Transportation, "These old cars we have remodeled are just right for heavy loads. The underframes were intended for more than passenger requirements. The remodeled cars with these new Westinghouse No. 548 motors, and hand operated HL control gives us a fast freight outfit which is just what we need as a business builder in this new freight haulage campaign of ours."

Westinghouse Electric & Manufacturing Co.

Sales Offices in All Large American Cities

WESTINGHOUSE ELECTRIC

East Pittsburgh, Pa.

Vol. 57, No. 10 New York, March 5, 1921 *Pages* 431-474

Electric Railway Journal

Henry W. Blake and **Harold V. Bozell**, Editors **Henry H. Norris**, Managing-Editor

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Improvement in Transportation Service for Camden

An active effort is being made to promote a spirit of co-operation in the personnel of the division. The formation of a company section of the American Association was considered highly desirable in this connection............Page 435

Electrification in Central Europe

The question of system is being studied in all countries. Switzerland and Austria are the only ones that are extending their single-phase lines. A résumé is published of the conditions that exist in Germany, Sweden, Norway, Holland and Italy..Page 438

Details of the New Type of Cars for London Subways

New steel rolling stock has been received by three of the railways operating rapid transit lines in London. These are the Metropolitan, the Metropolitan District Railway and the London Electric Railway. More rapid handling of passengers by multi-sliding door arrangement and longer trains is expected to relieve present congestion...................................Page 441

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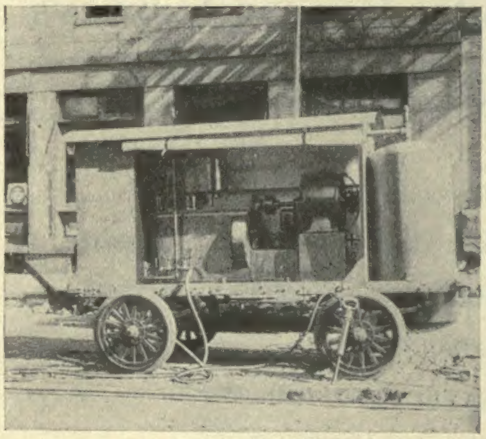
WESTINGHOUSE

SAFETY, EFFICIENCY AND ECONOMY

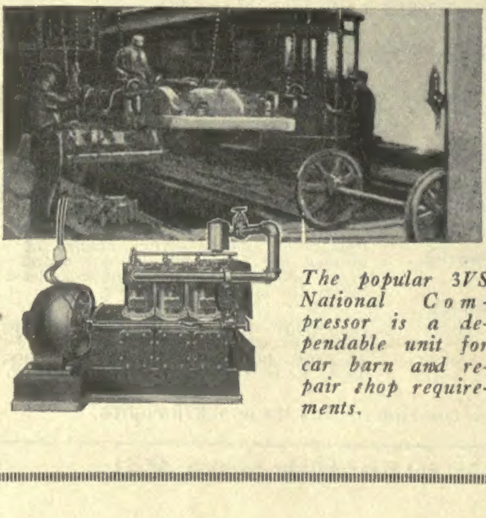


A Westinghouse National Portable Air Compressor for Track Repair Work and for Sand Blasting Rail Joints Before Welding.

THREE elements embodied in every Westinghouse product, whether Brake Equipment for rolling stock or a Compressed Air Plant for shop and track repair and construction work.

Apparatus with the Westinghouse imprint represents 50 years of experience in the Air Brake and Compressor business.

Save labor, fuel and time and safeguard your operations by specifying equipment built in accordance with the rigid standards of the Westinghouse organization.



The popular 3VS National Compressor is a dependable unit for car barn and repair shop requirements.

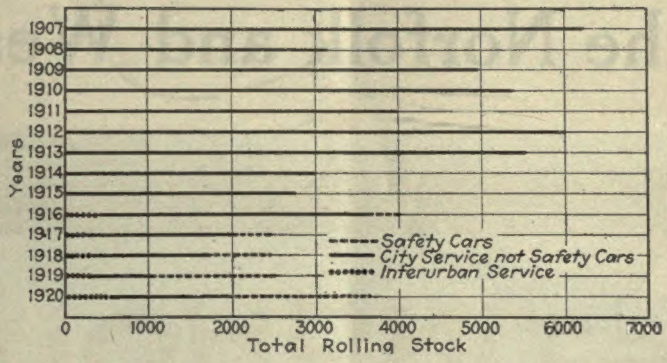
Westinghouse Traction Brake Co.
General Offices and Works:
Wilmerding, Pa.

OFFICES:

Mexico City
Boston, Mass.
Chicago, Ill.
Columbus, Ohio
Denver, Colo.
Houston, Tex.
Los Angeles

New York, N. Y.
Pittsburgh, Pa.
San Francisco
Seattle, Wash.
St. Paul, Minn.
St. Louis, Mo.
Washington, D. C.

Lines for Thought Concerning the Genuine Safety Car's Advancement



Please look at this chart from the ELECTRIC RAILWAY JOURNAL for Jan. 1 1921, showing new cars and locomotives ordered by United States and Canadian electric railways year by year since 1907.

Note the short dash lines that stand for SAFETY CARS ORDERED.

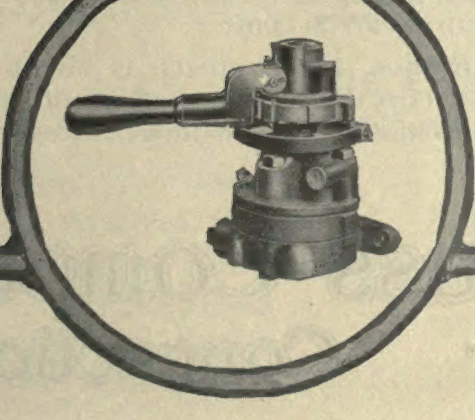
Only 187 in 1916, but 1699 or almost ten times as many in 1920.

More significant still: Of all the city cars ordered in 1920 more than 70% (1699 out of 2889) were SAFETY CARS.

Just one improvement in the art made the SAFETY CAR, as distinguished from any kind of one-man car, possible and popular.

That improvement was the laborless, safety interlocking of propulsion, braking and passenger-interchange equipment that goes under the name of SAFETY DEVICES and that is made and furnished only by this company.

Other cars may be one-man cars, but it is a genuine Safety car only when it is equipped with automatic laborless apparatus, so interlocked, that regardless of the illness or distraction of the operator, the power will be cut off instantaneously, the air brakes and sander apply immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed and the step folded before the car can start, and when the air-brake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.



Safety Car Devices Company

Boatmen's Bank Bldg., St. Louis

Chicago San Francisco New York Washington Pittsburgh

Phono-Electric
on the Norfolk and Western

Phono-Electric and Speed

"Scampering over the hill like a scared rabbit" the fast mail, express and passenger trains of the Norfolk & Western Railway are carried up the steep 3 per cent grade of the Appalachian Divide.

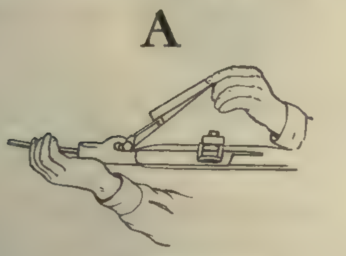
This is merely an auxiliary service to increase schedule speeds, the main service being in hauling 3250 ton coal trains up this grade at 14 m.p.h.

How well Phono-Electric is bearing the brunt of this service, said to be the hardest of any in existence, is the fact that this wire, put up in 1915, shows no appreciable wear and is estimated to be good for many years to come.

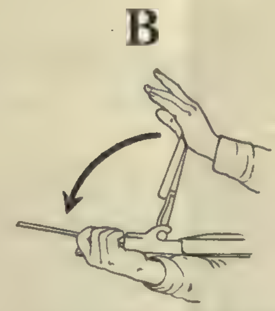
The secret of Phono-Electric on this electrification, as on others, is due to its strength, toughness, ductility and its ability to resist the combined effects of steam, grit and sulphurous gases from the steam locomotive stack without corrosion or deterioration.

Bridgeport Brass Company
Bridgeport 2276 Connecticut

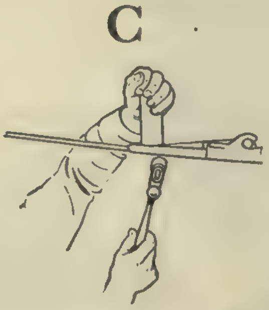
Installing O-B Cam Tips is Simple As:



Slip tip under hooks—



turn over and down on the wire—



clinch the lips and the job is done.

A lineman put up his first O-B Cam Tip device—a crossover—in half the time, by the watch, that it took him to install the other kind he had been working with every day.

In winter the lineman works with his gloves on. At night he quickly feels his way through the job. Cut traffc delay, lower the installed cost, get better under run with O-B Cam Tips.

These O-B Products are good all the way through to match the Cam Tips:

O-B Type E Live Crossover. Patented. Adjustable from 30° to 90°. Deflectors furnished from 30° to 60°

O-B Type F Insulated Crossover. Patented. Adjustable from 45° to 90°.

O-B Type D Frog, suitable for moderate speeds and all general city service.—Patented.

O-B Type ER Live Rigid Crossover (not illustrated) is similar to Type E. Made in 8°, 15°, 23°, 33° and 90° angles.

Besides O-B Frogs and Crossovers you can get O-B Strain Plates and Section Insulators with Cam Tips.

O-B Type E Frog, adapted for high speed service and for use where several types of cars are operated over same line.—Patented.

The Ohio Brass Co.
Mansfield, Ohio

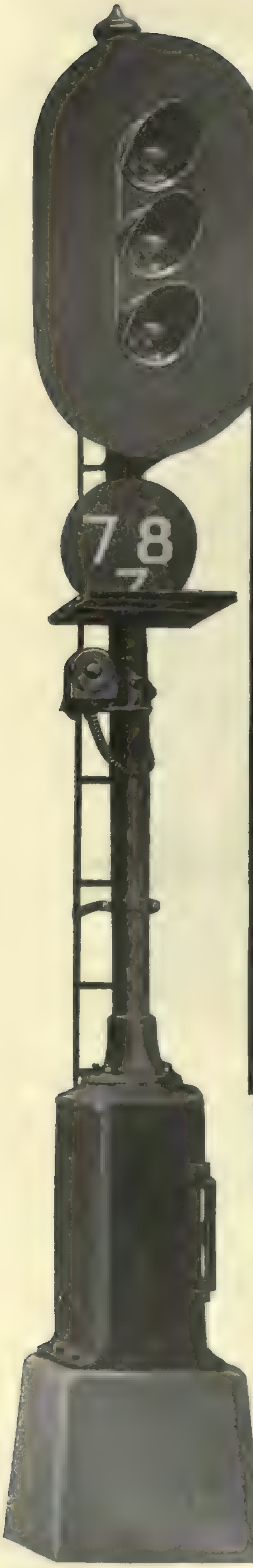
New York, Philadelphia
Pittsburgh, Chicago
Los Angeles, San Francisco
Paris, France

Manufactures:—
Trolley Materials
High Tension Porcelain
Insulators
Third Rail Insulators
Rail Bonds

UNION Style "L" Color Light

SIGNALS
Controlled by Continuous
A.C. TRACK CIRCUITS
Make
MAXIMUM OPERATING SPEED
Possible with
ABSOLUTE SAFETY
To the important freight and passenger traffic now moving over the entire 660 miles of the St. Paul's electrified divisions through the Rockies and Cascade Range.

THE CHICAGO MILWAUKEE AND ST. PAUL RAILWAY



Automatic Color Light Signals on
Electrified Divisions of the Chicago, Milwaukee & St. Paul Rwy.

"Union" Standard Uniform Equipment Throughout

Trade Mark

Union Switch & Signal Co.

SWISSVALE, PA.

Trade Mark

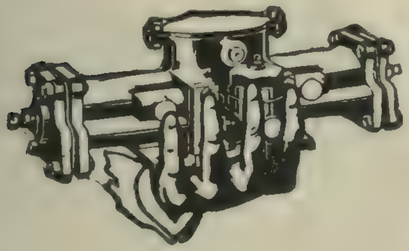
Standardize! *Pneumatize!*

Clang! Clang! Let's Go!!

Stamps the impatient motorman as he looks around and sees that the conductor is still a distracted car cashier.

With the traffic policeman at the crossing giving the "Go-Go," the conductor's delay may mean the loss of minutes—not just seconds.

What's the Remedy?



With National Pneumatic Door and Step Control on that car the conductor while still handling change or transfers could close the doors with a flip of his elbow or a push of his body.

And with Motorman's Signal Lights and Interlocking Safety Door Control added he wouldn't even have to reach up to a signal cord, because the closing of the doors would also signal the motorman and start the car instantaneously with a safety unapproachable by the most conscientious crew.

Just for fun, ask your platform salesmen what this combination could do for you in the maintenance of rush-hour schedules, in improving fare collection and in making the platform accident impossible.

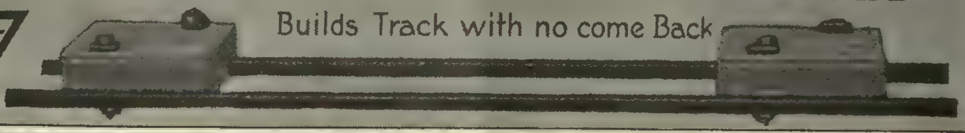
Make your peak periods produce maximum profit and efficiency

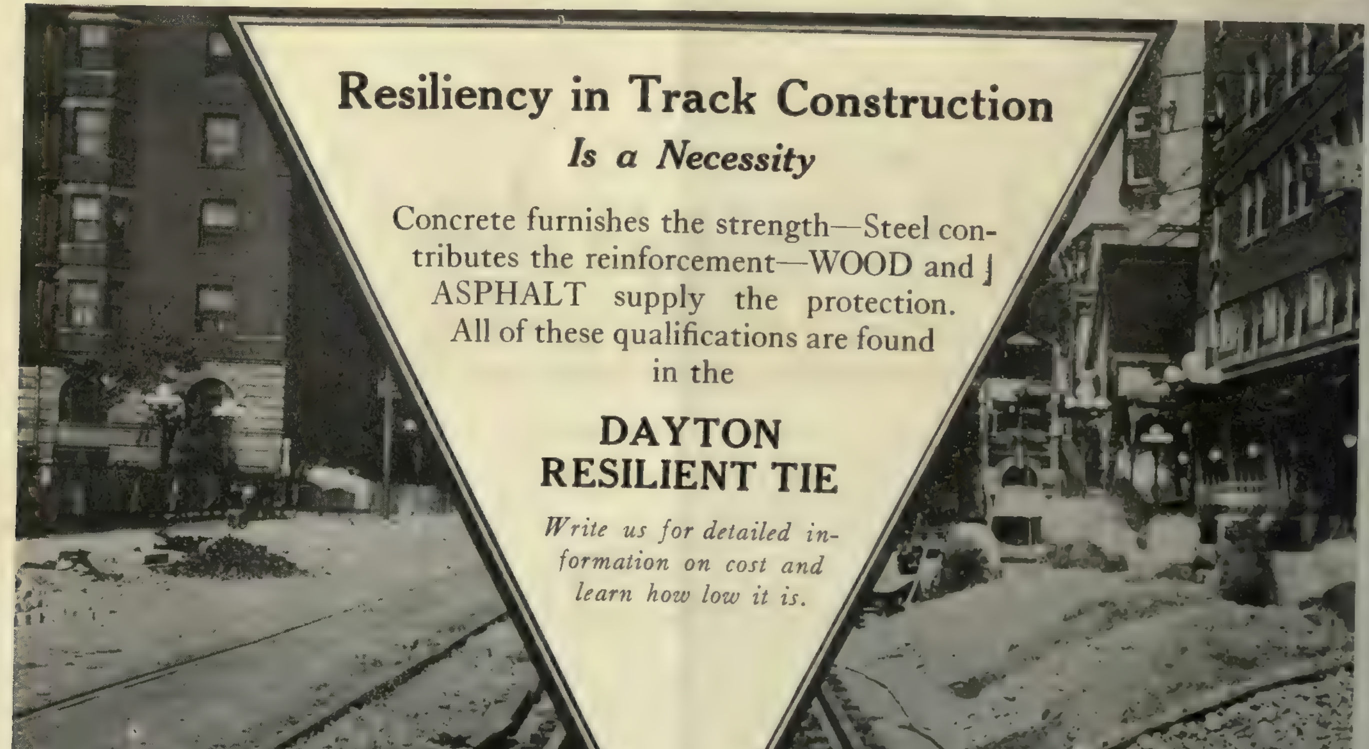
Manufactured in Canada by
Dominion Wheel & Foundries, Ltd.
Toronto, Ont.

National Pneumatic Company, Inc.
50 Church St., New York Edison Bldg., Chicago
Works: Rahway, N. J.

The RESILIENT RAILWAY TIE

Builds Track with no come Back





Resiliency in Track Construction

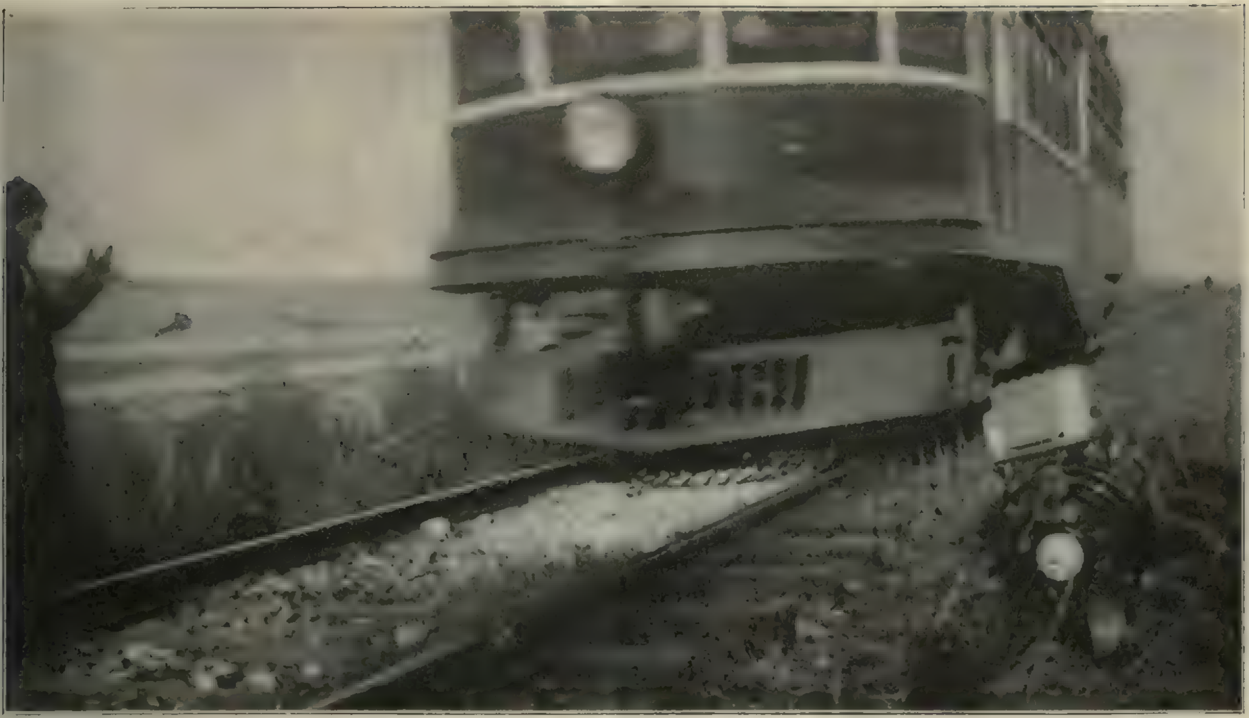
Is a Necessity

Concrete furnishes the strength—Steel contributes the reinforcement—WOOD and ASPHALT supply the protection. All of these qualifications are found in the

DAYTON RESILIENT TIE

Write us for detailed information on cost and learn how low it is.

THE DAYTON MECHANICAL TIE COMPANY
704 COMMERCIAL BUILDING, DAYTON, OHIO



Lincoln Bonds

The track is clear. The RWB Dynamotor has just put on a Lincoln Bond in less than one minute actual welding time. No car delay occurred and, most important of all, a permanent bond—built for strength—has been obtained. Every strand is welded to the rail, forming a perfect union of copper and steel.

Let us inform you in detail how one welding unit will do bonding, rail joint, track and shop welding. It pays for itself.

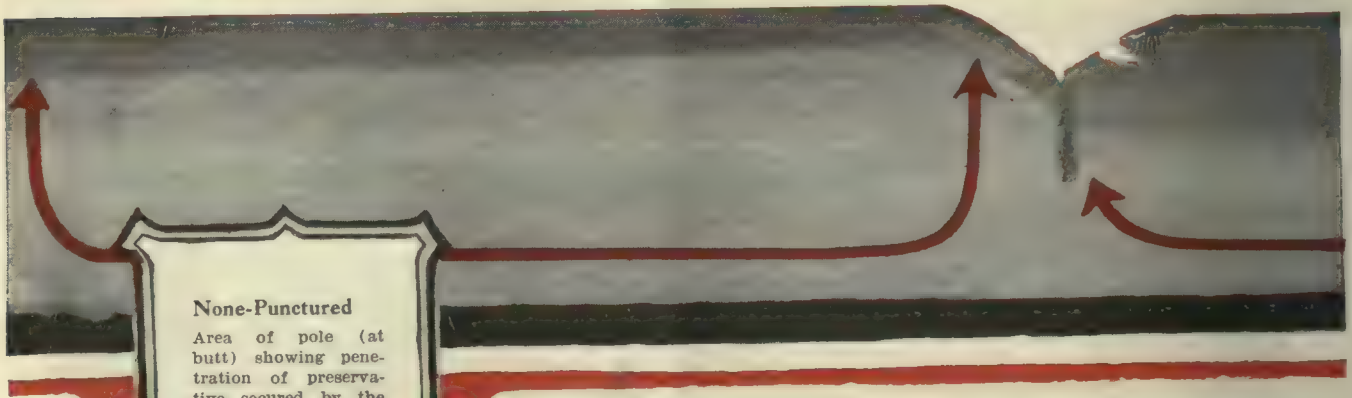
The Rail Welding and Bonding Company
Formerly The Lincoln Bonding Co.
RW&B
Cleveland, Ohio.

New York Office
30 Church Street

Chicago Office
343 So. Dearborn St.

London Representative:
Electrical Apparatus Export Corporation, 408-9 Bank Chambers—High Holborn

PEN



None-Punctured
Area of pole (at butt) showing penetration of preservative secured by the ordinary open tank method.

Slightly enlarged photo above (un-retouched) shows cross-section Pentrex-ed (punctured)

A new scientific process insuring satisfactory penetration of preservative

Western Red Cedar Poles are now machine-punctured at the ground-line area before treating. This new, scientific method of butt treatment is known as "Pentrex" and Western Red Cedar Poles so treated as "Pentrex Poles."

Pentrex marks a great step forward in the preservation of poles. By this method a maximum penetration is obtained. Every transmission engineer knows what this means in added life!

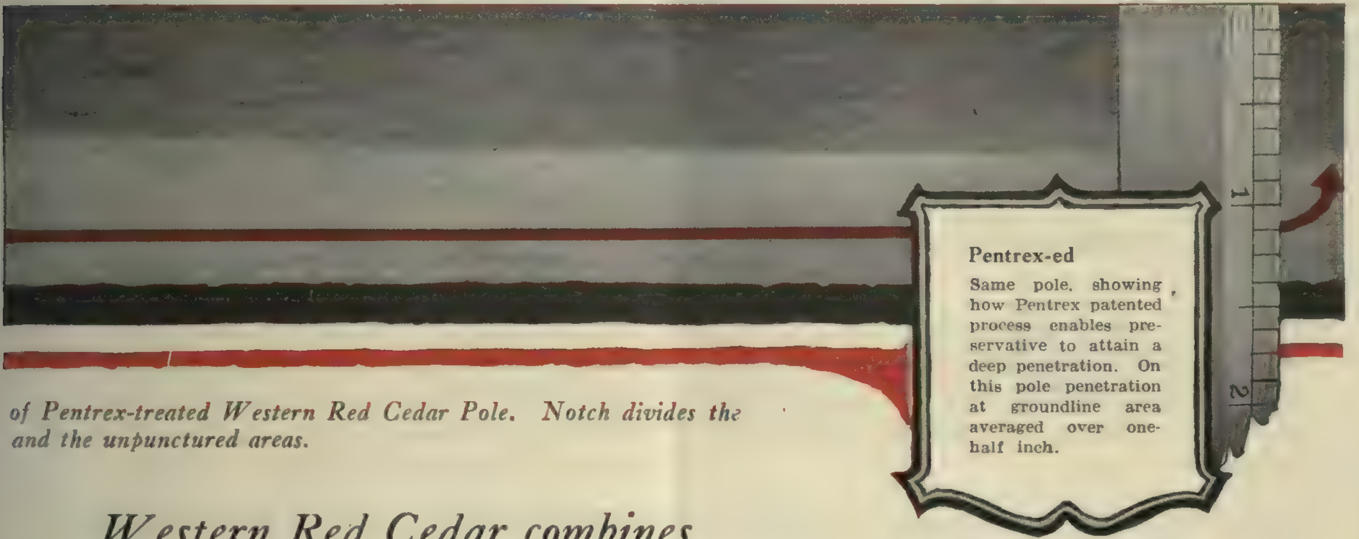
Look at the photographs above. Notice the difference in the penetration in area of the pole treated by the usual open tank process and that obtained on the same pole by the Pentrex method!

Pentrex treatment does not impair the strength or appearance of the pole.

Pentrex Poles will last years longer than those treated in the usual manner.

BUTT-TREATED WESTERN

TREX



Pentrex-ed

Same pole, showing how Pentrex patented process enables preservative to attain a deep penetration. On this pole penetration at groundline area averaged over one-half inch.

of Pentrex-treated Western Red Cedar Pole. Notch divides the and the unpunctured areas.

Western Red Cedar combines fundamental requirements for pole line supports

All Pentrex treated poles are of finest quality Western Red Cedar from the Rocky Mountain District.

They combine the six vital requisites for pole-line supports: Strength, Durability, Sightliness, Light Weight, Low Cost, Safety and Adaptability.

They're non-conductors of heat and electricity. Take climbing irons easily.

And the Pentrex treatment throughout the groundline area insures a durability never before possible.

If you're interested in learning more about Pentrex Poles and the method of treating, write now for further information.

Western Red Cedar Association
Peyton Building
Spokane, Washington

RED CEDAR POLES

The Lights that say: "STOP!"

— or "Proceed!" — or "Half Speed!" or "Carefull!"

Nichols-Lintern Indicating Signals are the lights that tell the motorman of the following car *exactly* what the motorman ahead is doing—eliminating rear-end collisions.

N-L Indicating Signals are the lights that tell the drivers of autos and trucks exactly whether the cars they are following are going to stop, slow down or continue full speed or half speed ahead.

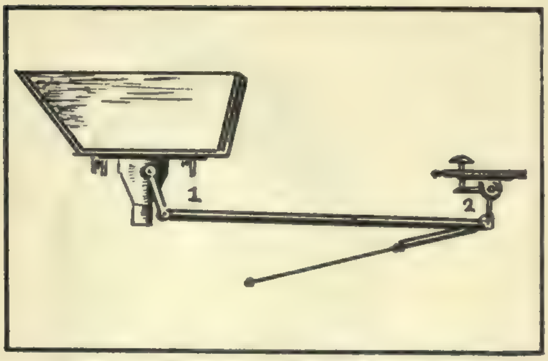
We operate instantly the controller handle is moved—*instantly* and *automatically!* There's no time lost where seconds count! There's no excuse for a rear end accident when the car ahead has N-L Indicating Signals.

These signals save power, by making it safe to coast. They also reduce the number of brake movements, causing less wear and tear on motors, brakes and trucks. They are ESSENTIAL equipment to make Safety Car operation *safer*.

The Sander that says:

"DEPEND ON ME!"

when the Air gives out—



Here is all there is to it for the Safety Car—rapidly and cheaply installed.

Depend upon it—N-L Mechanical Sanders will never fail you. They will never fail to apply the sand when and where needed at the slightest pressure of a foot. The sand can be started the instant the hand brake is applied and continued as long as necessary, bringing the car sharp up almost instantly.

Loss of air is apt to happen to any car. No car should be so equipped that sand cannot be instantly applied under that condition. If a handbrake appeals to you as an additional safety adjunct so should N-L Mechanical Sanders. Full details and literature on request.

The Nichols-Lintern Company

8404 Lorain Avenue, Cleveland, Ohio

Executives, Managers, Engineers and Way Officials

Are Called

To think clearly, decide wisely, act judicially.

The men of broad vision follow generalities and precedents.

They know:

> *"That cures are better than remedies"*
> *"That health is better than sickness"*
> *"That prevention is better than cure"*

They know:

> *"That true economy is final economy"*

They face the issue squarely. They don't "Put off the evil day."

Their books show that

> *"Dividends are made thru saving"*
> *"Deficits are made thru waste."*

No part of your system (railway, of course) is as vital as your tracks.

More trouble, expense and loss is caused by fugitive *splices* and *bonds* than any other one thing.

The biggest item in your maintenance is the most vital.

We can cure the "disease" in your old track.

We can keep it healthy.

We can prevent "cancer" in your new track.

We have done it and are saving railways in 46 States and countries millions of dollars in maintenance annually.

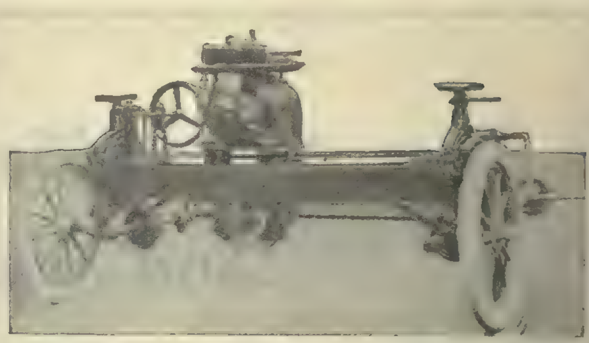
Think clearly, decide wisely, act today.

Send for our book on "Prevention and Cure of Track Disease"
It's Valuable. It's Free; It will save you money—Positively

Indianapolis Switch & Frog Co., Springfield, Ohio

J. J. Costello, New England Representative, 201 Devonshire St., Boston, Mass.

Atlas Rail Grinder

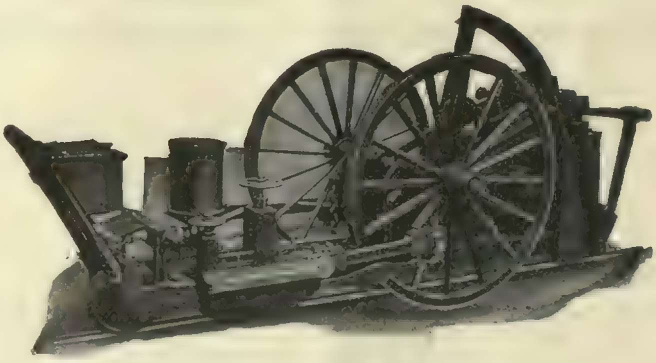


Universal Rotary Track Grinder

For removing surplus metal after welding

THE Atlas Rail Grinder employs the rotating grinding wheel method of operation and is used with good results for removing the surplus metal used to build up low joints by means of arc welding.

It is low in first cost. It is simple to operate, will last a life time and permit of high efficiency.



Reciprocating Track Grinder

For removing corrugation and grinding new and slightly cupped joints.

FOR removing rail corrugations and grinding new or slightly cupped joints and special work, the Reciprocating Track Grinder is easily the best. Through the planetary action of this grinder only the minimum of metal and consequent life is removed from the railhead in attaining a smooth tractive surface at least cost of operation.

—and the Universal Rotary Track Grinder has several additional features—among these are

Tilted grinding wheel; Outboard bearing on grinding wheel arbor for stability; Adjustable outrigger; Large Pneumatic derail wheels; Three point suspension of bronze bearing of grinding wheel arbor for stability of wheel; Simple adjustments; Ease of operation; Low working economy and upkeep.

RAILWAY TRACK-WORK CO.

3132-48 East Thompson St., Philadelphia, Pa.

Exclusive Agents:

ATLAS RAILWAY SUPPLY CO.
Chicago, Ill.

ELECTRICAL ENGINEERING & MANUFACTURING CO.
Pittsburgh, Pa.

Exclusive Agents:

CHAS. N. WOOD CO.
Boston, Mass.

HITCHCOCK, LLOYD & CO., Inc.
77A Queen Victoria St., E. C.
London, England

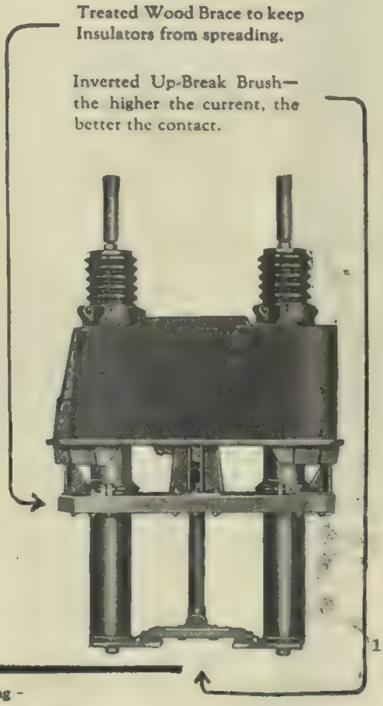
©Int. Photo Service.

When Taft was elected - in 1908

The Condit Electrical Manufacturing Company brought out the F-6 Oil Circuit Breaker, with inverted brush and insulator brace.

In 1920 The N. Y. Edison Company proved, by a series of elaborate tests, that the ordinary oil circuit breaker with the old-fashioned, movable brush was inefficient, and contrary to the fundamental magnetic law that a loop circuit under high current tends to expand the loop outward—forcing the brush away from its contact every half cycle and inevitably burning out the brush.

In the Condit F-6 this magnetic law was turned to advantage in 1908—thirteen years ago.


Treated Wood Brace to keep Insulators from spreading.
Inverted Up-Break Brush—the higher the current, the better the contact.

122-18

CONDIT ELECTRICAL MFG. CO.

South Boston 27, Mass.

Manufacturers of Electrical Protective Devices

Specifications: Maximum Volt 25,000; 500-1200 Amperes; 3 Pole; Hand or Electrically Operated. Removable Unit; Interrupting Capacity 10,000 Amperes at 15,000 Volts.

CONDIT

MERITAS LEATHER CLOTH

For Seats and Shades

Meritas Leather Cloth aids the railroad in giving its passengers comfortable, clean, sanitary, good-looking seats and attractive window shades.

Meritas is rich looking, pliant and leatherlike. It is an ideal material for the upholsterer to work with.

Meritas Leather Cloth *wears*. Our manufacturing methods give it exceptional resistance to chafing and shoe-scuffling. Moisture, dirt, stains, vermin and sticky fingers do not affect it. Water does not injure it, but only brightens and freshens it.

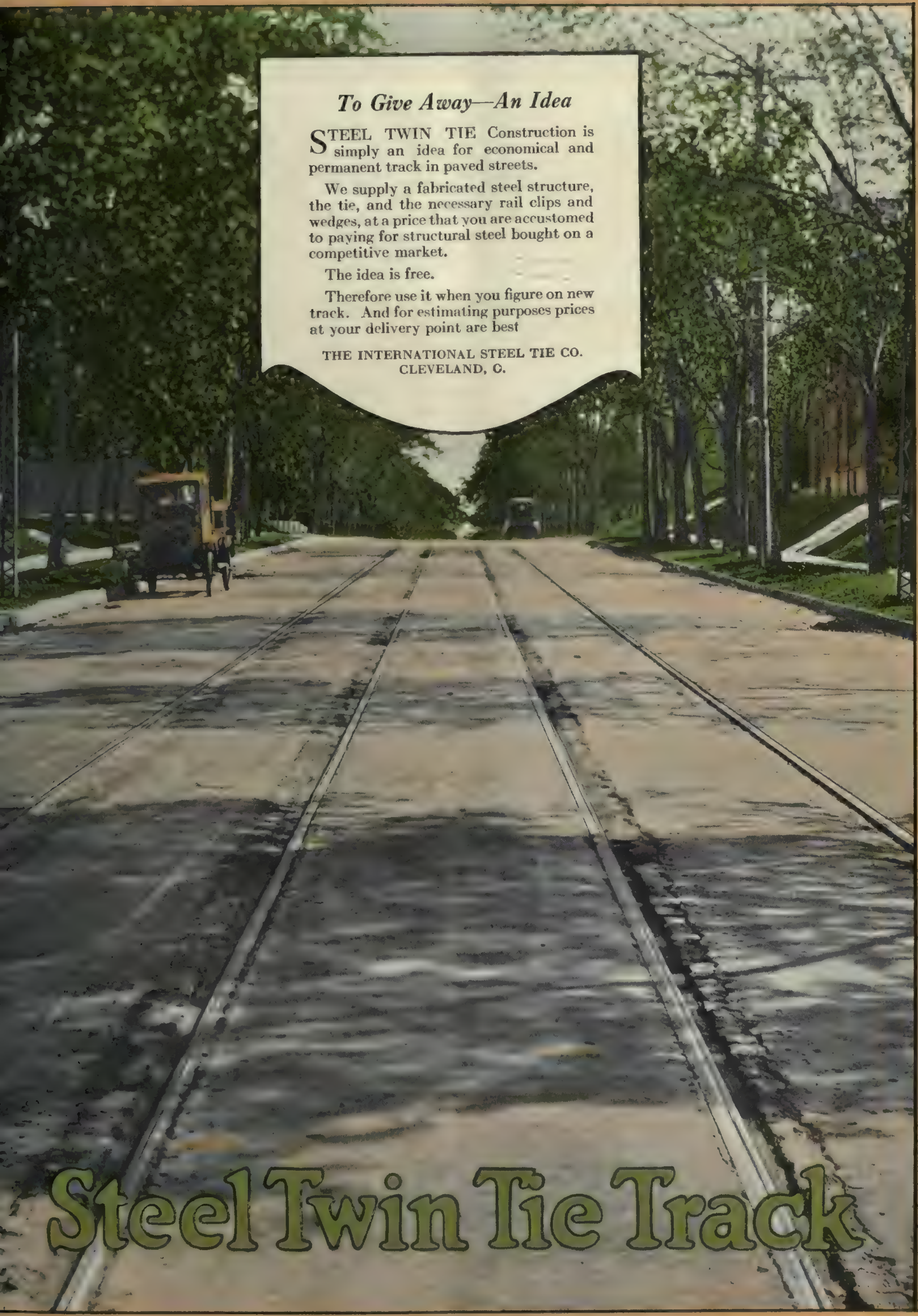
To assure the uniform quality of Meritas, we weave the fabric base in our own southern cotton mills and manufacture Meritas complete in our own factories, with every process supervised by specialists.

Every grain, weight, color and finish that could be desired for car seats or window shades is supplied by Meritas Leather Cloth.

Let us send you samples.

THE STANDARD TEXTILE PRODUCTS CO.
320 BROADWAY, NEW YORK
DEPT. E. R. J.

MERITAS
STANDARD
STP
TEXTILE PRODUCTS CO.
BRAND



To Give Away—An Idea

STEEL TWIN TIE Construction is simply an idea for economical and permanent track in paved streets.

We supply a fabricated steel structure, the tie, and the necessary rail clips and wedges, at a price that you are accustomed to paying for structural steel bought on a competitive market.

The idea is free.

Therefore use it when you figure on new track. And for estimating purposes prices at your delivery point are best

THE INTERNATIONAL STEEL TIE CO.
CLEVELAND, O.

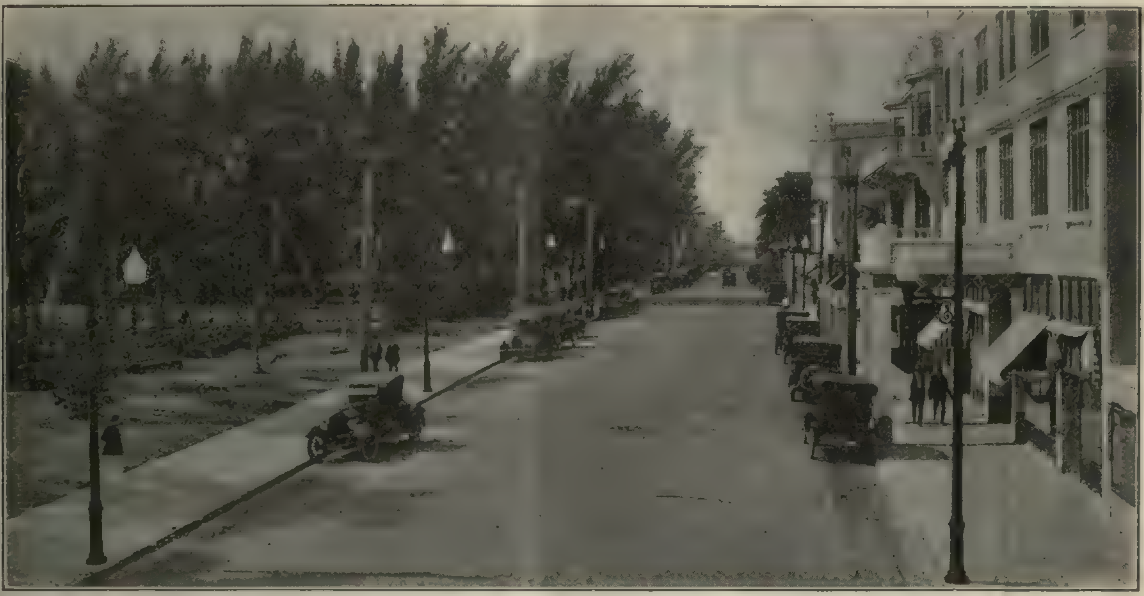
What is the Lowest Priced Paved Street Track Design?

UNDERSTOOD, of course that the construction must meet the City Engineer's requirements as a support for the paving in the track space.

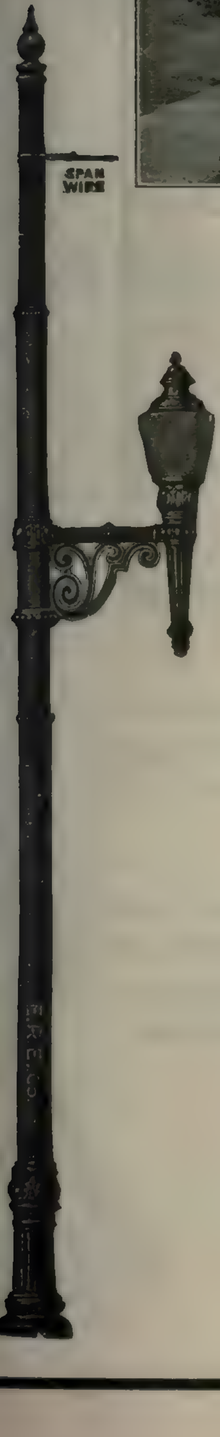
In entering Steel Twin Tie construction in this competition when you are preparing estimates we only request that we be allowed to put the complete data in your hands.

THE
INTERNATIONAL STEEL TIE CO
CLEVELAND. O

Beautify the Thoroughfare—practically



Miami, Fla., builds for the future, an electric railway system being projected



The proposed electric road will benefit by this improvement

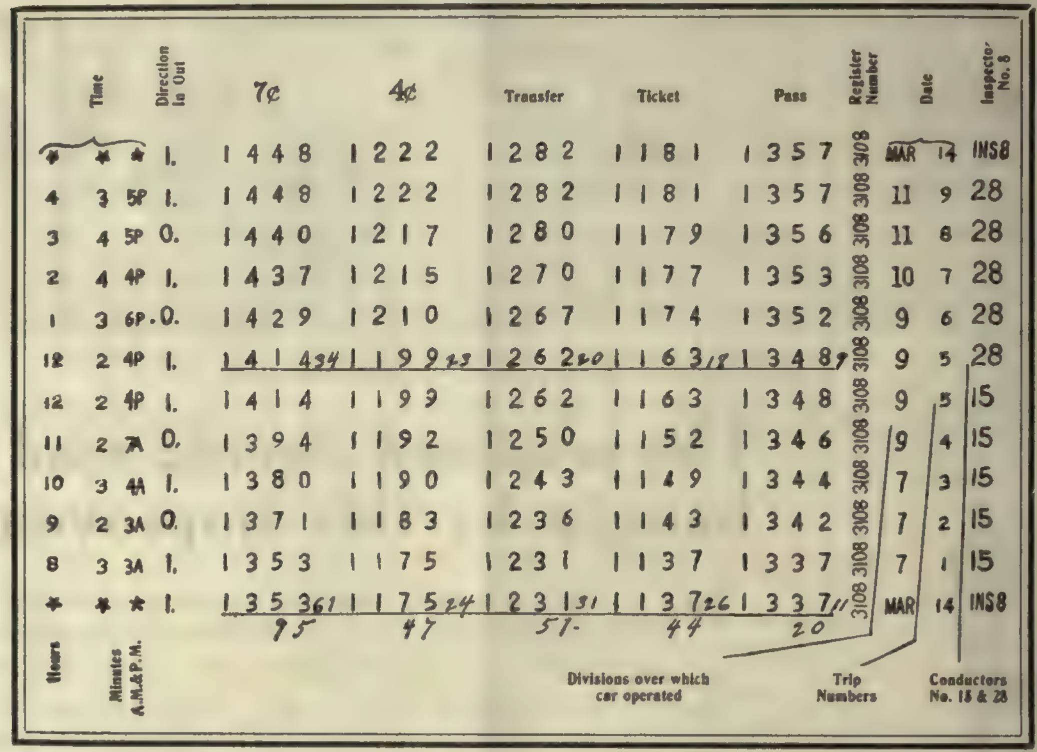
The electric railway company that has at heart the welfare of the several communities it serves acquires that public good will that stands them in good stead when fare increases are being considered. There is no better way in which to co-operate with municipal authorities than by beautifying the principal business streets and approaches to the city. A "White Way" at night and clean, spotless, up-to-date appearing streets in sunlight pull the crowds and create good advertising.

"Elreco" Combination Railway and Lighting Poles make the modern "White Way" and beautify by day the appearance of the street. The illustration above tells better than words what these poles accomplish.

Propose the improvement before the citizens and business interests demand it. Let us send you our folder of photographs.

Electric Railway Equipment Company
Cincinnati, Ohio
30 Church Street, New York City

The Ohmer System



Time			Direction In Out	7¢	4¢	Transfer	Ticket	Pass	Register Number	Date		Inspector No. 8
*	*	*	I.	1448	1222	1282	1181	1357	3108	MAR	14	INS8
4	3	5P	I.	1448	1222	1282	1181	1357	3108	11	9	28
3	4	5P	O.	1440	1217	1280	1179	1356	3108	11	8	28
2	4	4P	I.	1437	1215	1270	1177	1353	3108	10	7	28
1	3	6P	.O.	1429	1210	1267	1174	1352	3108	9	6	28
12	2	4P	I.	1414 34	1199 23	1262 20	1163 18	1348 9	3108	9	5	28
12	2	4P	I.	1414	1199	1262	1163	1348	3108	9	5	15
11	2	7A	O.	1394	1192	1250	1152	1346	3108	9	4	15
10	3	4A	I.	1380	1190	1243	1149	1344	3108	7	3	15
9	2	3A	O.	1371	1183	1236	1143	1342	3108	7	2	15
8	3	3A	I.	1353	1175	1231	1137	1337	3108	7	1	15
*	*	*	I.	1353 61	1175 24	1231 31	1137 26	1337 11	3108	MAR	14	INS8
				95	47	51-	44	20				
Hours	Minutes	A.M.&P.M.										

Divisions over which car operated

Trip Numbers

Conductors No. 15 & 28

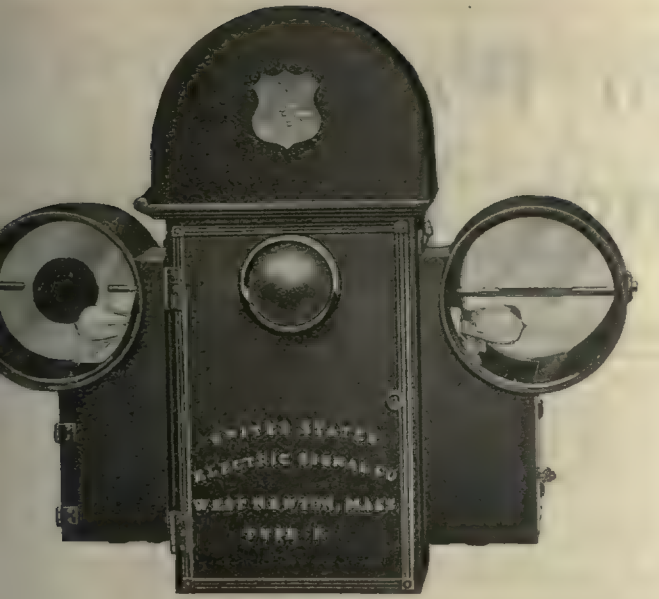
Printed records of transportation sales in street cars are necessary for the proper conduct of an electric railway.

Ohmer Fare Registers record immediately every transaction in such a way that no alterations are possible.

The amount of each fare is clearly indicated to the passenger when the record is made.

Manipulation, dishonesty and carelessness are reduced to a minimum. Loyalty, efficiency and co-operation are increased to a maximum.

Ohmer Fare Register Company
Dayton, Ohio



For More Mass Transportation on Present Tracks

U. S. Electric Trolley Signals
American Automatic Track Switches

Please bear in mind that U. S. Electric Trolley Contact Signals are not limited to protective purposes. They are a low-cost but certain means of permitting the shorter headways that build up traffic and make competition impossible.

And this additional advantage applies to city as well as country highway and interurban operation.

So, too, we ask you to consider the American Automatic Track Switch in a broader way than that of labor-saving, important as that is. In connection with safety car service, it keeps the operator on the *car* where he belongs; and in connection with any kind of car or train service, the American switch saves the seconds that spell faster schedules, greater track capacity and more revenue.

Write us concerning your need for either or both of these better-service, money-bringing devices already tandard on scores and scores of electric railways.

United States Electric Signal Company
West Newton, Massachusetts
Representatives:
Western: Frank F. Bodler, Monadnock Bldg., San Francisco
Foreign: Forest City Electric Services Supply Co., Salford, England

What Can We Do to Convince You?

Anyone can manufacture a piece of equipment and proceed to shout from the housetops that it will do this and that and the other thing. He might even sell some of his stuff on the strength of his arguments, but if he *can't back up his claims* —he's out of luck.

For that reason we'd much rather *show* you how Johnson Fare Boxes are attaining the ideal of maximum for collection on more than 200 Electric Railways. We'd prefer to submit facts and figures that make it clear how Johnson Fare Boxes increase revenue and decrease operating costs. Cold figures are always more convincing than the mere statement— "Johnson Fare Boxes will increase your gross revenue 3 to 10%."

When can we do to convince *you?*

One thing is certain. We can't do anything without your permission. But if you'll drop us a line our Engineering Department will be glad to present some figures on money making and money saving that you'll find mighty interesting. Isn't it worth a two cent stamp? Write today.

JOHNSON FARE BOX COMPANY

Ravenswood, Chicago, Ill.

Correct Lubrication means fewer hot boxes and cut axles

TO meet the insistent demand for reduced operating costs, executives in charge of Electric Railway maintenance are devoting careful thought to the problem of correct lubrication.

No longer are they satisfied to buy so many gallons of lubricant and "trust to luck" that results will be satisfactory. Nowadays, the demand is for lubrication *plus* intelligent lubricating service—a combination that works hand in hand toward reducing excessive lubrication costs.

Every Electric Railway using Tulc is considered as an *individual* problem, requiring a special lubricant and specialized lubricating service. That is why these properties report reductions of lubricating costs often as high as 40%. Decreased labor charges—reduced wear on axles and armatures—the elimination of hot boxes and cut axles are some of the economies brought about by Tulc and Universal Lubricating Service.

Our service men are prepared to work with you toward the solution of your lubricating problems.

Write us a letter today, outlining your case, and these men—all specialists—will be placed at your disposal.

"Overall Specialists"

The service men who work with you on your lubricating problems are not "experts on theories." They put on overalls and get right down to brass tacks—pack your cars—*show* you how and why Tulc should be used. They get results—real money saving results—99 times out of a hundred. The hundredth time there is no charge for the service.

The Universal Lubricating Co.
Offices: Schofield Bldg.
Works: Sweeney Ave.
Cleveland, Ohio

TULC
A
LUBRICANT

—scientifically and accurately compounded to reduce lubricating costs

Putting Pulling Power into the Business Paper

FOR the third time since January an *Electrical World* editor is traveling from New York to California in active co-operation with the National Electric Light Association. Three other *Electrical World* editors have made the trip from the Atlantic to the Pacific in the same period, scouring up and down the states between for facts and figures of essential importance to electrical engineering and commercial interests.

Out of the power plant world a demand, multiplied and insistent, comes for information on oil engines. As a result, a noted authority on Diesel and semi-Diesel engines is added to the editorial staff of *Power*. He is sent out to visit all important installations of these engines throughout the country. Over three months of travel and study will be spent by this *Power* editor solely to gain for *Power* readers a fuller knowledge of oil engines operating performance under all possible service applications and conditions.

A McGRAW-HILL man representing *Engineering & Mining Journal,* after having been forced out of Mexico by warring factions, has again plunged into that turbulent country to learn and report actual conditions affecting mining and oil well operations and prospects and equipment opportunities.

An editor of *Ingenieria Internacional* comes back from a long trip through the countries of South America bringing much valuable data on trade conditions, engineering and industrial development, and equipment requirements.

American Machinist recently sent one of its executives on a tour of Europe to study the metal-working industries abroad for the benefit of similar industries and machine-tool manufacturers at home.

An editor of *Engineering News-Record* also has just returned from Europe where he has been investigating engineering practice and equipment usage and needs in the construction field.

General departure from rule-of-thumb methods is an urgent need of the chemically controlled industries. To this end *Chemical & Metallurgical Engineering* has made an exhaustive investigation on which is founded one of the most significant and important issues of any publication in the engineering and industrial press—the September 8th "Convention" issue of *Chemical & Metallurgical Engineering.*

Electrification of steam railroads is a question pregnant with transportation improvement possibilities in this country. So an *Electric Railway Journal* editor recently made an extended trip over the system of the Chicago, Milwaukee & St. Paul R.R. to study this famous achievement in railroad development. Returning east this editor made a sweeping tour of Canada, getting data vitally interesting to American electric railway men and builders of electric railway material on today's methods, equipment, plans and outlook of the foremost Canadian electric railways.

The extraordinary success of *Electrical Merchandising* since its inauguration in 1907 is largely due to the indefatigable field work of the editors. These editors comb the continent with their journeys. They are constantly in personal contact with the electrical dealers, jobbers and contractors. They meet them at their conventions, clubs, clambakes, summer camps, offices, stores, warehouses and homes. They are keeping in touch with movements and materials and markets and methods and men—helping these men individually and through their organization.

Industrial, agricultural and commercial development of the West beyond the Rockies depends in large measure on the development of electricity from water power. To promote the industrial development of these great States with their specialized problem, McGRAW-HILL service to the electrical field was expanded in September, 1919, by the purchase of the *Journal of Electricity.* The acquisition of this publication demonstrates that McGRAW-HILL service, when conditions require, is intensive, as well as comprehensive.

As an editor of *Coal Age* recently wrote, "Read your *Coal Age* closely, and you will see that no stone is being left unturned to make *Coal Age* a mirror of the industry, to make the achievements and experience of some enterprising individual somewhere the pivotal point for an advance of the entire craft."

THIS is the policy that governs ALL McGRAW-HILL publications. It picks the ablest men as editors. It sends them out into the fields served by those publications. It bids them seek the problems of those fields. And through their publications these editors lead and co-ordinate the search for the answer to those problems.

That is the kind of service that puts pulling power into a business publication.

That is why McGRAW-HILL publications are dominant in their fields.

That is why they are read—with care and respect—by the biggest men in those fields.

And that is why they exert the influence on those men that makes advertising in McGRAW-HILL publications productive.

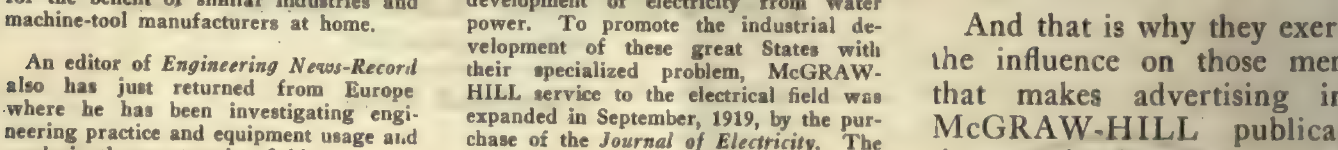
McGraw-Hill Company, Inc., Tenth Avenue at 36th Street, New York

American Machinist
Power
Electric Railway Journal

Electrical World
Journal of Electricity
Electrical Merchandising

Engineering News-Record
Coal Age
Engineering & Mining Journal

Ingenieria Internacional
Chemical & Metallurgical Engineering



The World's best Lubricants

G A QUALITY E N A

A five cent cigar
and
A gallon of oil

Picture a discriminating smoker choosing a cigar because of its size or the color of the band; there are many five-centers as large as the finest perfectos.

Likewise with lubricating oils—it is not the bulk, but the *quality,* that counts! The gallon measure is but the gauge of quantity, while quality—the real test of value—must be measured by the units of lubrication the gallon contains. Modern business efficiency establishes correct proportions that facts may be properly weighed and balanced. Railroads keep records of costs, of mileage and of materials used.

By these records—on the railroads of the North, South, East or West—the *Galena gallon* shows its quality value in lubrication units by ability to give much greater service than the gallon of the ordinary lubricant.

Galena Oils welcome the tests of actual service and stand on the open records of real performance figures, on the principle that no fairer standards can be used as measures of true worth and value.

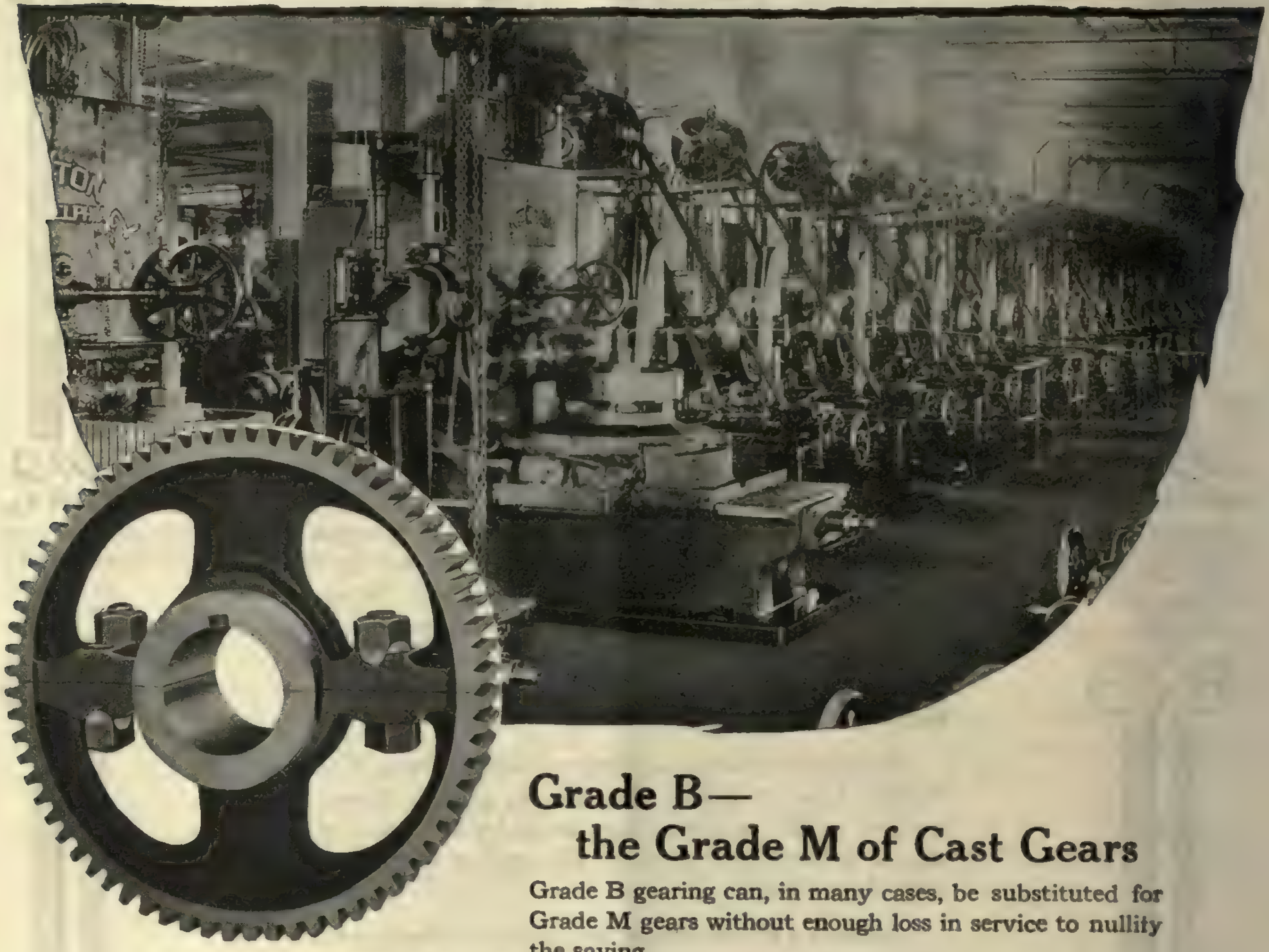
Buy Bulk and get Oil.
Buy Quality and get Lubrication.

TRIGRAM
G S O C
TRADE MARK

THE GALENA-SIGNAL OIL CO.
NEW YORK FRANKLIN, PA. CHICAGO
Offices in all principal American Cities
LONDON BUENOS AIRES PARIS

GALENA SERVICE

When less costly material can be substituted, without a prohibitive decrease in service obtained, a worth while economy has been accomplished.



Grade B—
the Grade M of Cast Gears

Grade B gearing can, in many cases, be substituted for Grade M gears without enough loss in service to nullify the saving.

A steel casting forms the basis of Grade B and this enables the manufacture of the split type of gear, impossible with a forging. Grade B blanks are so carefully inspected that only such are used as are entirely free from sand or blow-holes.

Grade B gears receive practically the same heat treatment as the famous Grade M, which insures a product so nearly equal to the forged gear as to serve as a satisfactory substitute on all but the heaviest duty. Grade B is our most durable grade of cast gear.

Why not try them on your lines?

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

40-135

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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G. J. MACMURRAY, News Editor

Volume 57 New York, Saturday, March 5, 1921 *Number* 10

Applying an Old Principle in New Ways at Camden

IN AN ADDRESS before the American Electric Railway Association at Atlantic City last October Martin Schreiber of the Public Service Railway of New Jersey impressed his auditors with the fact that he appreciated to an unusual degree the importance of co-operation in organization. Moreover, he aimed to apply this principle in his own way on the portion of the Public Service property of which he had then recently been appointed manager.

Already Mr. Schreiber has been able to try out some of his ideas, and the results are as expected. A number of the things that have been done are outlined elsewhere in this issue. The article may be considered the ELECTRIC RAILWAY JOURNAL'S supplement to the Atlantic City convention address.

The best single "stunt" is the maintaining of close contact between the "service committee," comprising principally the heads of departments, and the actual problems of the property. This is accomplished in part by taking the committee bodily to the places where the problems originate. Such procedure requires a little time, but this expenditure is soon repaid through the economies achieved as a result of the conferences. The minutes of the conferences, which are kept in detail, show that this plan for holding committee meetings is mentally stimulating.

Camden is a city which presents unusually complicated transportation problems. The traffic is largely of the "rush-hour" variety, involving a low "load factor" in the use of the rolling stock. The difficulties were particularly acute during the war period. The conditions render close teamwork on the part of the personnel especially desirable. Those who ought to know say that such teamwork is conspicuous at Camden. The result will undoubtedly show on the ledger in due course.

Making the Schedule More Scientific

THE urgency of decreasing the ratio of outgo to income in electric railway operation has become so acute that schedule making now assumes a position of prime importance. It comes down to the proposition of giving good and constantly better service on one hand, while relatively increasing the revenue passengers per car-mile operated without unnecessary overcrowding.

There is today perhaps no greater opportunity for economy in electric railway operation than in correct schedule making. Savings at this point, at the present prices for labor, quickly reach so large a sum that any possibilities of improvement in this line warrant the most careful study on the part of the transportation department. But good schedule making requires expert schedule makers, of a type not needed, or not known to be needed, a few years back.

The art of the schedule maker is not an easy one. In the first place, if too few cars are run, possible traffic is lost, while if too many are scheduled, there is a waste in car-miles. The schedule maker has not only to determine the right number for the different hours of the day and where the cars are to be turned back but also how the schedule must be varied according to the weather, the day of the week, and the season and special events. Then he has to fit the desirable car schedule so determined with a suitable crew schedule, and then allow provision so that both can be changed quickly in case of emergency or blockade, without disturbance to the operation of the cars on the rest of the line. At the same time he must keep within the run limitations and outside time of workday set by agreements with employees. This work is arduous and complicated, since it demands a constant scrutiny of the factors whose change may affect existing conditions. Nevertheless, perhaps because it calls for this vigilance, it is fascinating and carries an especial appeal to the man who likes to solve problems in a field that is constantly changing, as is the case with city traffic.

Personally, we believe that graphical methods could be used in drafting and checking scheduled headways and car flow over crossings and through congested districts to a much greater extent than has been done in the past. The problem is essentially one of proportion and the adjustments of various factors to each other so as to give a harmonious whole, and for problems like this graphical methods are particularly suitable. They not only supply the means for obtaining an answer but they seem also better adapted to expose any serious defect in a proposed schedule than if a numerical method was exclusively used.

C. E. R. A. Awakens to Renewed Purpose and Activity

MUCH important history has been made in the past by the Central Electric Railway Association, but with the trying conditions faced by many of the members at home during the past three years the association could not be as much of a factor in their affairs. Hence it is not surprising that the program of the recent meeting at Toledo should have included as one topic for consideration "The Future of the C. E. R. A." It is pleasant to record that this taking stock of past accomplishments and future activities resulted in such a rejuvenation of the spirit of the association that the meeting took on the interest and importance which was characteristic of the association gatherings before the war.

Far from having served its purpose and being no longer vital, there developed a consciousness that the association is more than ever needed by the members and that it has only made a start on the great work to be done. Realizing this, the members laid plans for the future which bid fair again to make important history

Better Transportation for Camden

A New Organization Takes Hold of the Southern Division of the Public Service Railway of New Jersey — An Active Effort Being Made to Promote a Spirit of Co-operation in Personnel of the Division—Formation of a Company Section of American Association Considered Highly Desirable in This Connection

THE SERVICE COMMITTEE IN FRONT OF ITS MOVABLE MEETING QUARTERS
Left to right, T. E. Babcock, F. B. Summers, H. C. Stevenson, Martin Schreiber, Chairman; R. A. McArthur, J. Walter Wright, J. Hanf, J. N. Waters, C. V. Wallace, G. A. Rothery, Secretary, and William H. Wright

THE Southern Division of the Public Service Railway, which centers in Camden, N. J., is in many ways like a detached property because it is separated by a considerable distance from the divisions which comprise the main mileage of the property. During the war the shipbuilding and other abnormally augmented industries brought unusual prosperity to the district, which, however, did not extend to the railway company, but it is now suffering somewhat of a post-war slump. However, there are many substantial manufacturing properties within the Southern Division territory, such as that of the Victor Talking Machine Company, and there is heavy traffic to and from Philadelphia, a part of the suburbs of which the Camden region is.

The Southern Division operates 155 cars and employs about 1,000 persons all told. Last summer Martin Schreiber, chief engineer of the company, was appointed manager of this division, with sufficient authority to apply such methods as he deems wise. Since then he has had opportunity to apply a number of them on the property.

The groundwork of the scheme now under way in Camden was first explained in a paper by Mr. Schreiber before the convention of the American Electric Railway Association at Atlantic City last October. The plan is based first on a carefully selected, progressive, supervising organization. This organization is so co-ordinated with the rank and file that every man has a voice in the creating of the orders under which he labors, as well as in the carrying out of his particular part of the transportation work.

The organization "heads up" in a "service committee," comprising principally the heads of departments. This meets weekly for the purpose of discussing principles and details of the work of the several departments. The meeting place is a special car belonging to the division, which is taken out over one line at a time, visiting points of administrative interest. The meetings consume about three hours on the morning of Friday, the day preceding the weekly conference of general department heads at Newark, which is attended by Mr. Schreiber.

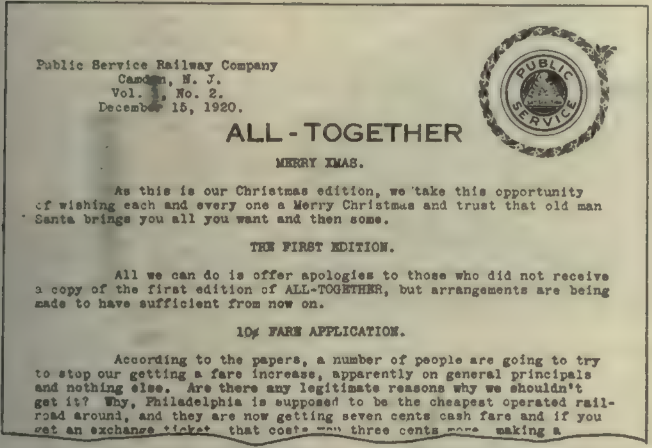
MAKE-UP OF SERVICE COMMITTEE

The make-up of the service committee at present comprises, in addition to the manager, the following: R. A. McArthur, superintendent of transportation; T. E. Babcock, claim agent; J. Hanf, master mechanic; J. W. Wright, superintendent of maintenance of way; C. V. Wallace, superintendent of employment and instruction; F. B. Summers, storekeeper; J. N. Waters, engineer; W. H. Wright, superintendent of distribution, and G. A. Rothery, chief clerk and editor of "All-Together," an employees' periodical leaflet. H. C. Stevenson, who is assistant to the president and is in charge of public relations of the Southern Division, also sits in with the committee.

Mr. Rothery acts as secretary of the service committee meetings and keeps full and accurate minutes, which are of great value in conserving the many excellent suggestions made by heads of departments.

SPEEDING LOADING AT THE FERRY TERMINAL

The point of greatest traffic congestion on the Southern Division is at the Philadelphia ferry terminal in Camden. Here many of the lines terminate, and the installation of a prepayment inclosure for the two loop terminals is under consideration. In the meantime, however, the handling of traffic is being facilitated by the sale of fare receipts on the street to expedite rapid boarding of the prepayment cars. This plan, which originated in Camden, has proved so successful that it has been adopted elsewhere at congested points on the system.



Public Service Railway Company
Camden, N. J.
Vol. 1, No. 2.
December 15, 1920.

ALL - TOGETHER

MERRY XMAS.

As this is our Christmas edition, we take this opportunity of wishing each and every one a Merry Christmas and trust that old man Santa brings you all you want and then some.

THE FIRST EDITION.

All we can do is offer apologies to those who did not receive a copy of the first edition of ALL-TOGETHER, but arrangements are being made to have sufficient from now on.

10¢ FARE APPLICATION.

According to the papers, a number of people are going to try to stop our getting a fare increase, apparently on general principals and nothing else. Are there any legitimate reasons why we shouldn't get it? Why, Philadelphia is supposed to be the cheapest operated railroad around, and they are now getting seven cents cash fare and if you get an exchange ticket that costs you three cents more making a

A SMALL BUT AMBITIOUS EMPLOYEES' BULLETIN

One receipt booth was also erected, and at present four street ticket, or receipt, sellers are employed from 3 p.m. through the rush hour. On the first day that this plan was inaugurated 700 tickets were sold, and the number increased rapidly to about 8,000 on Saturdays. The result was a reduction of the time of loading to 1.47 seconds per passenger. A count showed that 80 per cent of the patrons now use the tickets. When this result was ascertained the company posted the following notice at the ferry terminal:

> **Co-operation Wins**
>
> An official record taken at the ferries shows an average loading time of 1.47 seconds per passenger. This means shorter headway, faster time and improved service.
>
> Public co-operation made this possible.
>
> THANK YOU
>
> *Public Service Railway*

One thing that the management has resolved to do is to reduce the time lost through car delays. To this end an emergency truck, a Maxwell line truck, has been detailed to duty for emergencies. It is manned with a crew of three, representing respectively the track, shop and line departments, although it is under the supervision of the distribution department. It is the duty of this crew to repair promptly to the scene of any delay and by the use of expert knowledge clear up the blockade.

The service committee is endeavoring to formulate a logical publicity policy. Under war conditions the service became unpopular, due partly to the influx of aliens to the war industries. It became quite the thing to do to "knock" Public Service. To counteract this the committee is endeavoring to take the standpoint of the public and has adopted an emblem containing the slogan "Public Service—Safety, Service, Satisfaction." The last three words were chosen because they represent what the public wants of the railway and what the railway is trying to furnish.

AN ALL-ROUND EMPLOYMENT DEPARTMENT

Coming now to the employees, the first point of interest is the department of employment and instruction for the entire body of employees. It is what might properly be called a personnel department, and is highly organized. This department is in charge of C. V. Wallace, who previously was engaged in somewhat similar work for the Philadelphia Rapid Transit Company.

The functions of the department are these: (1) Development of sources and channels of labor supply; (2) selection of suitable applicants for positions on requisition by a head of a department; (3) introduction of new employees into service; (4) supervision of training and following up of new employees; (5) transfers and promotions as between departments; (6) maintenance of individual records of all employees with issuance of badges and other forms of identification; (7) maintenance of close relationship with the medical department; (8) maintenance of an active interest in all activities of a social nature; (9) the interviewing of all employees leaving service with a view to conserving labor and giving data for analysis of causes of leaving.

TYPICAL SHOP INTERIOR, PUBLIC SERVICE RAILWAY, CAMDEN

The record cards for the several classes of employees are distinguished by colors, but are identical in form. Mr. Wallace has devised a complete set of record forms for his work, some of which have not been used before.

On the Southern Division it is the practice to play one evening a month. Two minstrel shows have been given at the Camden carhouse. They proved very popular and served to create a friendly feeling among the employees. As this article is in preparation a masquerade ball is being planned.

The service committee desires to get suggestions from the men regarding improvements in the service and has prepared a form entitled the "Co-workers' Suggestion Blank," copies of which have been distributed under the auspices of the employees' union. The union local also is endeavoring to co-operate with the management through honor and safety committees in every possible way. The receipt of every suggestion received is acknowledged and those that are useful are noted in the service committee minutes.

THE PUBLIC SERVICE HEADQUARTERS IN CAMDEN

It was noted above that H. C. Stevenson, in charge of public relations, also is a member of the service committee. The closest co-operation is thus maintained between the public relations and the actual operation of the property. It is the policy of the service committee to consider the necessity of gaining and holding confidence and good will of the public as well as actually furnishing service. For example, sometimes the service committee sits as a public relations committee to consider some emergency matter, like the company's application for a 10-cent fare. Wherever possible, representatives of the service committee appear personally at meetings of municipal and civic bodies throughout the division to present the company's side of the trolley question.

The employees' leaflet, "All-Together," that has been mentioned, is simply a letter multigraphed on both sides and sent to the men's homes. It discusses in an intimate way the problems of the property and has a human touch through mention of personal happenings. "All-Together" is also a strong factor in producing better teamwork and better public relations. The following is an excerpt from a recent issue:

> Teamwork between the company and its employees, having shown good results in improving discipline, which is the backbone of safe and satisfactory service, let us now make a drive for future co-operation between the company and the people. Please tell our patrons that the company welcomes any communication by word or by letter of any complaint, criticism or commendation about the railway and such communication will be acknowledged and receive sincere, careful and intelligent consideration. Of course, a letter would be preferred, but verbal communications for example may be reported by the trainmen to the inspector, who will be glad properly to pass the word along. Cultivate the feeling that the company wants to please its patrons.

In order that the service committee shall be kept up to date on public opinion as far as possible, clippings are made regarding matters pertaining to the trolley company, in the office of the assistant to the president, and each clipping is pasted on a standard letter-size sheet of paper. The clipping is sent in order to each member of the service committee, who initials it, and it is finally returned to the original office for file and reference.

The service committee has also established what is known as the "Booster File." Any commendatory letters received, for one cause or another, are filed alphabetically by municipalities.

A company section of the American Electric Railway Association has also been formed at Camden, with the title "Public Service Railway Camden Section." It was organized with seventy-five members. C. V. Wallace, superintendent of employment and instruction, is president. The service committee believes that the key-word of the section is "Education," and education to the effect that no boss can be bigger than his men collectively nor any company better than its employees. The company section will be an open forum where all subjects, including operating as well as public relations, will be discussed. The men will be handed the truth first hand and the company section is expected to have its good effect in promoting better public relations.

Accident reduction is another problem before the

A CAMDEN STREET SCENE, FEATURING PUBLIC SERVICE ROLLING STOCK

CAMDEN SHOPS OF PUBLIC SERVICE RAILWAY, IN CHARGE OF J. HANF

service committee. Already some things have been done and accidents have been reduced through better supervision. The important plans thus far used are these:

Standardized warning signs have been placed near all curves. Alternate white and black bands have been placed on the poles, up to five poles from the curve, the number of bands indicating the number of poles that the curve is away.

A safety bulletin board has been installed at the office of each department head for the posting of timely notices.

Safety signs have been placed on the car doors.

The service committee has also given attention to inspection during the "wee, small hours." Formerly there was no inspection from 1 to 6 a.m. Now a night inspector, furnished with an automobile, appears at any point of the division without warning. Any infraction of the rules is promptly reported and the offender is disciplined the next morning.

Inspectors are also furnished with punches having characteristic forms, which are used by them in inspecting conductors' returns. Examination of the sheets thus shows by the punchings just what each inspector has done. The following instructions to inspectors give more details regarding this matter:

On Dec. 6 a number punch will be added to your equipment, which is to be used by you when inspecting the work of conductors.

The day card used by the conductor should be examined thoroughly to see if same is properly filled out in every detail.

Give particular attention to the columns marked "Schedule Time" and "Leaving Time" as well as columns "From" and "To," and if cars operate from different terminals than scheduled, see that proper note of same is made on day card.

Pay close attention to the reverse side of day card, noting whether conductor has properly filled in car and farebox numbers and check the readings of registers with commencing numbers on car record.

Note whether conductor is making a proper record of letter carriers, policemen and firemen on the reverse side of day card.

After day card has been properly inspected and omissions entered on errors corrected, punch same in the column marked "Closing Number of Transfer" in space of particular trip in which you have boarded car, being careful not to cancel any figures appearing thereon.

IMPORTANT

When making a register check or box check for conductor's work and conductor offers free passes or 7-cent tickets as part of his work, punch one impression in center of these tickets, which will signify you have inspected same, thereby preventing conductor from utilizing these tickets and substituting them for cash fares received on later trips.

This punch can be made an important adjunct in your work and with proper use of same, a considerable number of irregularities on the part of conductors will be overcome.

A successful effort has been made to reduce pull-ins, which formerly occurred often on slight provocation. Block numbers have also been placed on both ends of each car to identify it more readily.

The service committee also believes that it would be a paying proposition to make provision for pressing the uniforms of the platform men on account of the better impression that would be made upon the public.

SCENE AT THE FERRY TERMINAL, CAMDEN, WITH TICKET BOOTH AND COLLECTOR IN EVIDENCE

Measuring and Removing Rail Corrugation

FRANZ SCHREY, civil engineer and head inspector of the Vienna (Austria) Municipal Tramways, has just issued a twenty-page pamphlet on the subject of rail corrugation. He describes the use of a motor-car grinding apparatus, employing a sliding stone device which is effective in eliminating corrugations.

Of special interest is Mr. Schrey's account of an instrument for measuring and recording corrugations on an enlarged scale. It consists of a carriage, which slides on a long bar held on the rail. The carriage carries on the top an arm, with a tracing point on the outer end, and below a plunger which makes contact with the rail surface. The upper end of the plunger pushes upward in the recording arm and is placed at such a point with relation thereto as to give the desired amplification of motion at the end of the lever. The plunger is forced downward by means of a spring and the recording arm is suitably weighted.

Electrification in Central Europe

The Question of System Is Being Studied in All Countries—Switzerland and Austria Are the Only Ones that Are Extending Their Single-Phase Lines — Scarcity of Coal Makes Electrification Highly Desirable — A Résumé Is Published of the Conditions that Exist in Germany, Sweden, Norway, Holland and Italy

By E. C. ZEHME
Berlin, Germany

INTIMATELY involved with the present status of the electrification of the principal railroads in the central European countries is the unanswered question as to the best kind of current to be used. It has been customary to consider Germany, Switzerland, Austria and Sweden as the advocates of the single-phase system, but they are not so today. Only Switzerland and Austria are at present extending their single-phase roads, whereas no definite conclusions have as yet been reached as to a standard system in Germany, Sweden, Norway and Holland, and even in Italy. The renewed doubts as to the best system are aroused by the conspicuous success in the operation of the American high-voltage, direct-current railways. The final preference in France for the direct-current system is due to the same cause, while the direct-current has also come off victorious in Great Britain. Some details of the situation in each of the middle European countries mentioned will be of interest.

GERMANY

For the present the electrification of German main railroads has been confined to two lines, the Magdeburg-Halle-Leipzig lines via Dessau and Bitterfeld, with 108 miles of route and 346 miles of single track, and the Lauban-Königszelt line, with 171 miles of route or 311 miles of single track. Both of these lines suffered badly during the war, and only the small stretch between Königszelt and Dittersbach was in electric operation. Strenuous efforts are now being made to re-establish operation on these lines, the principal difficulty being with the overhead wire. During the war all copper wires were removed and are now being replaced, but as an experiment part of the overhead is being restored with iron wire. Regular operation has begun between Königszelt and Hirschberg on the Silesian Mountain roads, and it is expected that trains will be running as far as Lauban during the present spring.

The necessary authorization for the connections east to Breslau and west to Görlitz has been issued. Service will undoubtedly be begun very soon on the Saxonian line between Magdeburg and Leipzig.

The decision made in 1913 to electrify the entire Berlin rapid transit system is now beginning to bear fruit.*

At first the two northbound lines between Berlin and Hermsdorf and Berlin and Bernau respectively will be electrified.

As on all present state railroads, the single-phase system has been adopted here, to avoid complication of systems. However, as the entire Berlin rapid transit system in itself is detached from the State Railways and could be operated independently electrically, taking power from the main railway power line, it would seem as this would not be a controlling consideration.

Obviously, the war greatly retarded the development of electrification on the main railroads in Germany. This was undoubtedly partly due also to the experimentation which was indulged in by the former State Railway Department administration. The experiments referred to included the use of locomotives for urban rapid transit rather than multiple-unit motor cars, the use of short cog rails to assist in starting trains to offset the small adhesive weight of the locomotive, the use of single contact points instead of a continuous wire for power supply, with contact-making strips the length of the train, and finally a scheme for a hydraulic transmission gear between the motor and the locomotive axle. Several of these ideas were incorporated in experimental equipment.

Recently doubts have been advanced from several sides as to the practicability of the single-phase system for the main railroads of Germany. An induced voltage of 4,000 has been effected in the 50 miles of the feeder line in the cables carrying low voltage signal current on the Silesian Mountain road, destroying the cable rapidly. Furthermore, the locomotives with their single-phase commutator motors placed high and driving the wheels through connecting rods are at present requiring excessive maintenance work. Nevertheless the authorities still manifest a preference for the single-phase system and have decided to call an international congress this year in Germany to go over the whole matter, presumably hoping that the present viewpoint of the Prussian State Railways in regard to the system will be justified.

Skepticism has developed also with regard to the advisability of using electric locomotives on the Berlin rapid transit lines, and some test trains consisting of motor cars and trailers will be built to demonstrate locally the practicability of the system which elsewhere has been long established.

There are now all told about 472 miles of electrified lines, or 940 miles of single track, on the main roads in operation in Germany; that is, in Prussia, Bavaria and Baden. These installations were all made by German electrical manufacturers.

AUSTRIA

The electrification bureau of Austria is actively at work, and a bill has been introduced in the national congress for the use of electric traction on the state railways, embracing and standardizing all existing individual plans. This bill, which has now been passed, rules that, conforming with the laws passed Dec. 20, 1919, and May 20, 1920, all work already under way should be actively pushed so as to permit electric operation if possible not later than June 30, 1925, on the following lines:

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*See issue of ELECTRIC RAILWAY JOURNAL for July 3, 1920, page 20.

1. Arlberg line (Innsbruck-Landeck-Bludenz) and Vorarlberg line (Bludenz-Bregenz-Lindau) and branch lines.
2. Salzkammergut line (Steinach-Irdning-Attnang-Puchheim lines).
3. West line (Salzburg-Schwarzach-St. Veit-Wörgl lines).
4. Tauern line (Schwarzach-St. Veit-Spittal-Mill-Stättersee lines).

The total length of these lines will be 363 miles, and with the extensions which have been planned for later addition, the total will be 1,108 miles, or 40 per cent of all state roads operated in Austria.

Of these lines, 658 miles are single track and 450 miles are double track.

The electrification of these lines is considered of urgent importance, because Austria today produces only 16 per cent of the coal which it requires, and electrification would permit the saving of 50 per cent of the demand. Under the influence of Prussia, the Austrian State Railway Administration has adopted single phase with 15,000-volt contact line potential at 16⅔ cycles.

The power supply will be taken from the newly erected station at the Spullersee (for the Arlberg line), at the Stubachtal and on the Mallwitz, and the hydro-electric plant on the Rutzbach (Mittenwald line) will be enlarged. The Salzkammergut road will be supplied from the existing power plant.

The electrification of the Arlberg line, with its maximum grade of more than 3 per cent, has already been begun. The locomotives have been ordered from German-Austrian firms. In these the weight upon any one shaft will not exceed 14½ metric tons, and the total weight will be 2.1 tons per foot of over-all length. On the freight locomotives the single-phase commutator motors will drive the coupled axles by means of gears. On the passenger locomotives the motors are geared to a jackshaft which is rod-connected with the drivers.

Omitting the lines in contemplation, there are 250 miles of route of electrified main lines in operation in Austria, or 358 miles of single track. Of these two-thirds are operated single phase and one-third direct current.

SWEDEN AND NORWAY

The present total length of electrified railway in Sweden is 90 miles, of which 81 miles is single phase and the remainder direct current. In Norway the respective mileages are 45, 28½ and 16½.

The Swedish State Railways have actively pushed their electrification program. The Riksgränsen Road from Kiruna to the Swedish-Norwegian border in the north has been in operation with its heavy ore trains since 1914. It is a single-phase road operated at 15,000 volts, 15 cycles, and takes its power from the Porjus hydro-electric station.

Electrification of the southern extension of this line from Kiruna to Lulea, 190 miles, is at present under construction. The northern extension from the border to the port of Narvik is being planned by the Norwegian State Railway. The electrical equipment for this will be furnished by Siemens-Schuckert and the Allgemeine-Elektricitäts-Gesellschaft.

The Swedish State Railways plan to electrify additional lines, principally in the south, and primarily for passenger traffic. Here the question of system has again been studied very carefully and the following estimates have been reached as to comparative merits of: Three-phase rotary converters, converting alternating current to direct current; (b) three-phase motor generators, converting three phase to single phase; (c) straight single phase. The over-all efficiency from power plants to train is placed at 54 per cent, 55 per cent and 64.7 per cent in the three cases respectively. The corresponding building investment would be 100 per cent, 94.5 per cent and 97.2 per cent, while the operating cost would be 13.2 per cent, 13 per cent and 12.6 per cent.

In Sweden, although it would be possible to obtain power from the general three-phase system of the country, it is considered safer, although more expensive, to generate the railway power in separate plants.

Although the single-phase system is estimated to be somewhat more economical than the other, the difference is small and is being considered in connection with the inductive disturbances in telegraph and telephone lines caused by the alternating-current operation. A special commission on this subject has studied the phenomena carefully, together with the remedy for the trouble, and has presented a long report. This is unfavorable to the single-phase system. The matter is now being taken up again because the Swedish Reichstag has accepted a project to electrify the Stockholm-Gothenburg line. In accepting an alternating-current project for this line, the understanding was that a satisfactory method be found to prevent disturbance in existing telegraph and telephone lines.

HOLLAND

The Holland State Railways intend to electrify all their lines and are now debating the question of system. To date 32 miles of track have been electrified, 12 with high-tension direct current (1,200 volts) and 20.5, from Rotterdam to Scheveningen, with 10,000 volts single-phase current, 25 cycles. Both of the present electrifications are old and cannot be used as examples for new projects. The single-phase line was built in 1908 and the direct-current line in 1911, both by the Siemens-Schuckert works.

The Holland State Railways have appointed a commission to study the railway systems of the world, including the American direct-current lines and the Swiss alternating-current systems, with a view to prescribing for the country's needs, with due reference to the lack of coal and the necessity for avoiding inductive disturbances.

ITALY

Italy is a country lacking coal but rich in water power, and hence has long been interested in electrification of its railways. Today there is an electrified track mileage of 640, of which 265 are operated by direct current, 198 by three-phase current and the remainder by single-phase current.

The principal lines are those using three phase, a field in which Italy did pioneer work. The foundation for this system was laid by Ganz & Company (Budapest), with the Valtellina line employing 3,000 volts and 15 cycles, installed for the Italian State Railways. This work was continued by the Westinghouse Company at Vado, Ligure, under the direction of Mr. Kando, while Swiss builders equipped the Simplon line, contributing to this development.

The direct-current lines are mostly west of Milan, toward Varese. The single-phase roads center around Rome and Naples, but a few short three-phase lines can also be found in northern Italy.

The present critical coal situation has brought electrification to the front with a new impetus. A program has been prepared for the electrical equipment of all the principal lines, of a combined length of 1,160 miles, which will eventually give Italy a total of 1,860 miles of electrified road. The first two groups of 826 miles will be built by the state and include lines near Genoa, Trieste, Pisa, Parma and Verona, all in northern Italy. The third group, involving 505 miles, will be built by private capital. Up to the present Italy has favored the three-phase system and from the records it must be admitted that it has worked out very well, especially on account of the success of regeneration on the southern slope of the Alps. As a result, this system will be used for the present, but the possibility of changing over to another system is being kept in mind. Good results are expected to follow the close co-operation of the government with the privately built railways.

When the Valtellina road was electrified (1900-1902), followed by the Simplon tunnel (1905), the use of gears between motor and axles had not yet come into favor, and in the Valtellina contract gears were specifically excluded. Later, such good results have been achieved with gears, as for example on the Lötschberg electrification and in America, that they will be considered in future electrification plans of Italian railways. This will permit the use of a higher frequency and possibly a current supply from existing power plants. On two lines near Rome three-phase current of a frequency higher than fifteen cycles will be used.

SWITZERLAND

The country of Switzerland was designed by nature for electric traction, and here there is an electrified mileage of 535, divided as follows: 177.5, high voltage direct current; 71.5, three phase, and 286 miles single phase. The government's commission for the study of the electrification of the federal railways has recommended the use of single phase at 15,000 volts, with 15 to 16⅔ cycles. This was adopted more than four years ago. The system was first used by the Oerlikon Company on the experimental track between Seebach and Wettingen in 1905 to 1907 and was later adopted by the Prussian State Railways.

The Swiss Federal Railways constitute 75 per cent of all the railways in the country. In 1913 it was decided to electrify the Gotthard line, after the Bernese Alpine system had electrified the Lötschberg line in the same year with 15,000 volts, 15 cycles. The first locomotives for this road were of Oerlikon make.

In 1918 the Federal Railways took up a large electrification program and, as previously explained in this paper, divided the entire mileage into three groups. Of these the first comprises 705 miles, of which 14 miles have already been electrified. The second group involves a mileage of 376, and the third one of 637, a grand total still to be electrified of 1,704.

In the original plan a period of ten years was allowed for the electrification of each group, but this will undoubtedly be modified. On July 1, 1920, the first freight train went through the Gotthard tunnel, and on Sept. 15, 1920, the first passenger train went through. Regular operation experienced a setback owing to an accident in the Ritom power house. After repairs, service was resumed in November, 1920. The locomotives for the Gotthard tunnel were built in part by the Oerlikon works and in part by Brown, Boveri & Company. (See ELECTRIC RAILWAY JOURNAL, Aug. 7, 1920, page 256.)

Among the important private electrifications in Switzerland may be mentioned the Rhaetian Railway, opened in 1920, and the Bernese Alpine Railway.

Cost of Pavement Maintenance and Resurfacing in Chicago

INCLUDED in the forty-fourth annual report of the Department of Public Works of Chicago for the year 1919 are some figures on the cost of maintenance and resurfacing various kinds of pavements. By "repair" in the following table is meant the patching of holes, cracks, etc., as they appear, while resurfacing is the tearing up the surface and relaying:

PAVEMENT REPAIR COSTS

	Cost per Square Yard
Sheet Asphalt	$1.94
Brick	1.53
Creosote block	2.25
Water-bound macadam-oiled	0.45
Asphaltic-concrete	1.90
Granite block	0.96

RESURFACING COSTS

	Cost per Square Yard
Asphaltic-concrete	$1.94
Macadam	1.69

The cost of asphalt delivered to the job obtained by averaging the outputs of three separate plants is:

ASPHALT COSTS

	Cost per Ton
Top	$9.46
Binder	6.88
Asphaltic-concrete	7.28

The average cost of oiling macadam pavements in Chicago was $0.013 per square yard.

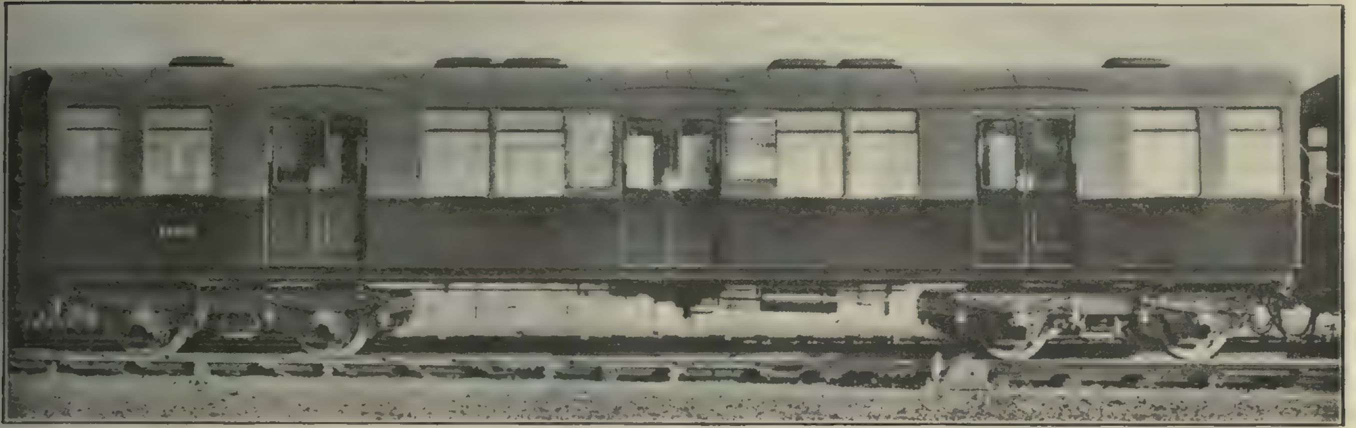
Jitney or Bus Competition

J. F. McLAUGHLIN, writing under the above caption in the *Stone & Webster Journal* for February, 1921, states that during the height of the unregulated jitney craze in 1915 from 6,000 to 10,000 machines were in operation in this country. He stated that it soon became apparent to municipalities and other regulatory bodies that the unregulated jitney congests traffic, impairs the proper functioning of the street railway system, and, in fact, destroys instead of adds to the existing transportation facilities of the community, and therefore must be regulated. The development of regulation has caused in many places the complete elimination of this form of competitive transportation, so that at present there are estimated to be only from 2,000 to 3,000 jitneys operating. Three-fourths of these are charging fares in excess of 5 cents.

This competition, Mr. McLaughlin states, has been a costly experiment to many communities and traction companies, but has taught the following lessons: (1) That street railway service and jitney or bus service cannot both exist for any length of time as competitors in the same field. (2) That with jitney or bus competition the whole or a large part of a community pays a higher fare than would be necessary if the total traffic were handled by the street railway. (3) That when operated under conditions similar to the street railways, the jitney cannot meet the transportation requirements of a community as satisfactorily or as cheaply as the street railways. (4) That the jitney or bus cannot supplant the street railway as a means of supplying urban transportation.

New Type of Cars for London Subways

New Steel Rolling Stock Has Been Received by Three of the Railways Operating Rapid Transit Lines in London—These Are the Metropolitan, the Metropolitan District Railway and the London Electric Railway—More Rapid Handling of Passengers by Multi-Side Door Arrangement and Longer Trains Is Expected to Relieve Present Congestion



THE THREE-DOOR TYPE OF CAR RECENTLY ADDED TO THE DISTRICT RAILWAY

ABOUT the middle of December the London Electric Railway received the first consignment of some forty new cars of an improved design to supplement the rolling stock on the Piccadilly line. At almost the same time deliveries were begun to the Metropolitan District Railway on its order of 100 new cars from the Metropolitan Carriage, Wagon & Finance Company of Birmingham, and the Metropolitan Railway Company has just put into service one train of new cars of an improved design. The Metropolitan District Railway's order is made up of forty motor cars and sixty trailers, twelve of which have control equipment and cabs for operation. Deliveries of these cars are expected in installments at short intervals. This new equipment will be used during heavy traffic hours in eight-car trains made up of three motor cars, four trailers and one control trailer. At times of lighter traffic these trains will be cut into three- and five-car trains. The seats of the motor cars are arranged to accommodate forty, those of the control cars forty-four, and of the trailers forty-eight. The order of the Metropolitan Railway is made up of twenty motors and thirty-nine trailers. Over-all dimensions of these cars are given in the accompanying illustrations.

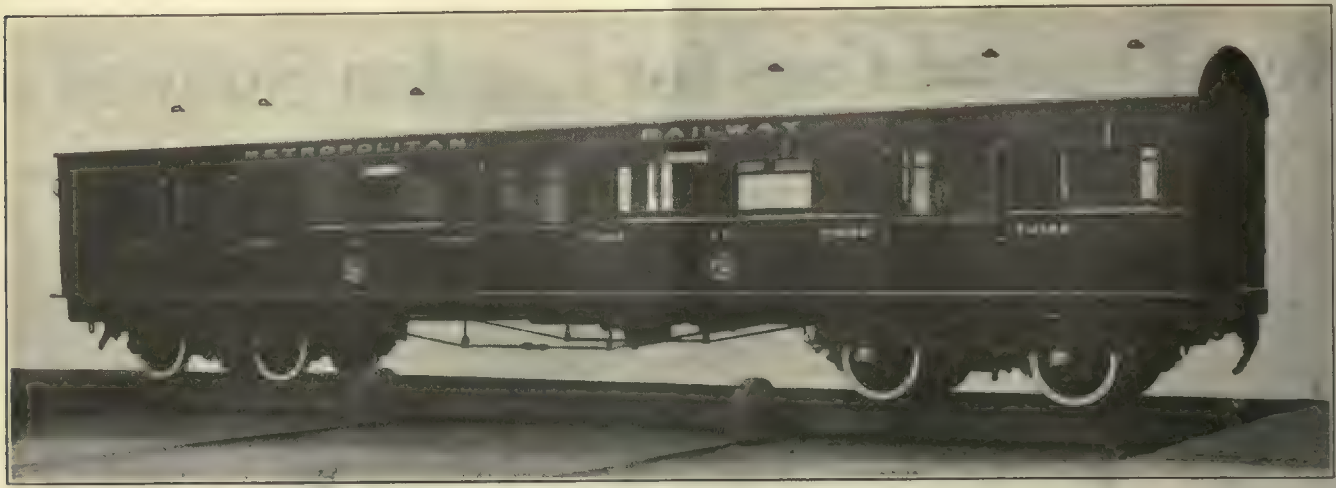
STUDIES OF DOOR ARRANGEMENT

A considerable amount of experimenting has been going on in regard to door arrangement on the London underground railways. The problem was to devise such an arrangement and number of doors in each car as would provide the most speedy entrance and exit of passengers without materially reducing the seating capacity of the car. Hitherto the multiple-unit cars of the Metropolitan Railway and the Metropolitan District Railway, which operate in open and covered cuts, have had end doors entering into vestibuled platforms and additional center side doors. On the so-called "tubes," or deep-tunnel lines, end doors furnished the only means of entrance or exit. This practice was departed from recently in the case of the joint rolling stock of the Baker Street & Waterloo Railway and the London & Northwestern Company's line from Willesden to Watford, which has side doors.

Some time ago the Metropolitan Railway found as the result of tests that during the busy periods of the day the average duration of station stops when the cars of the trains had end doors only was from forty-two to sixty-two seconds. In the case of cars with additional center side doors the time was reduced to from forty-two to thirty-nine seconds. About a year ago an experiment was made with a train having five single doors on each side of each car. Experience revealed certain disadvantages, among them being that passengers tended to congregate near the doorways and to interfere with free egress and ingress.

Based upon this experience, this last order has provided for three double doors on each side of the car and the end vestibules have been dispensed with, the space thus saved being used to give additional seating accommodations. Seats are provided for fifty passengers and are arranged transversely on both sides of the aisle, with here and there a double seat between them. The door and seating arrangement is much the same as on the cars of the New York Municipal Railway. Strap-hanging, as on other recent cars, has been abolished by the provision of steadying rails at a convenient height and by using grab handles at the aisle corners of seats.

Another innovation is the provision of a glass screen flanking each door, which, in addition to giving passengers immunity from draught, has the effect of breaking up the interior of the car into a series of semi-compartments. In connection with the design of the new cars the Metropolitan company has made modifications under which it expects that there will be a marked improvement in the heating and ventilating arrangements and in smooth running as compared to previous types. The underframe is constructed entirely of steel and the floor is covered with steel plates, over which is a layer of fireproof cement. The weight of the trailer



ONE OF THE NEW THREE-DOOR CARS FOR THE METROPOLITAN RAILWAY

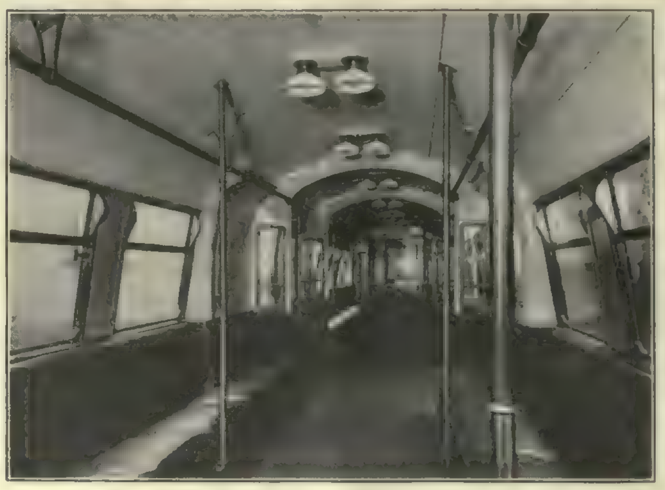
car is 22 tons and that of the motor car 46 tons. The builder is the Metropolitan Carriage, Wagon & Finance Company, Birmingham.

FEATURES OF DISTRICT RAILWAY'S NEW CARS

The new type of car for the Metropolitan District Railway is shown in the accompanying illustrations, and from them the new door arrangement can be seen. Each car, like those described above, has three double sliding doors per side for passenger use. On the motor cars there are also two single doors at each end into the motormen's compartment and likewise two for the one compartment of a control car. These cars are about one foot wider than the older ones, the body width extending almost to the edge of the step board of the earlier type. They exceed cars of previous design in length by a few inches. By the omission of the vestibule single doors and their replacement by double doors about 10 ft. from the car end, all seats now fall within a distance of 9 ft. from an exit, which distance, it was found, is about the maximum distance that people will go from a door. This introduction of a larger door to serve both directions will result, it is expected, in the more expeditious handling of crowds and, consequently, in a shorter stopping time.

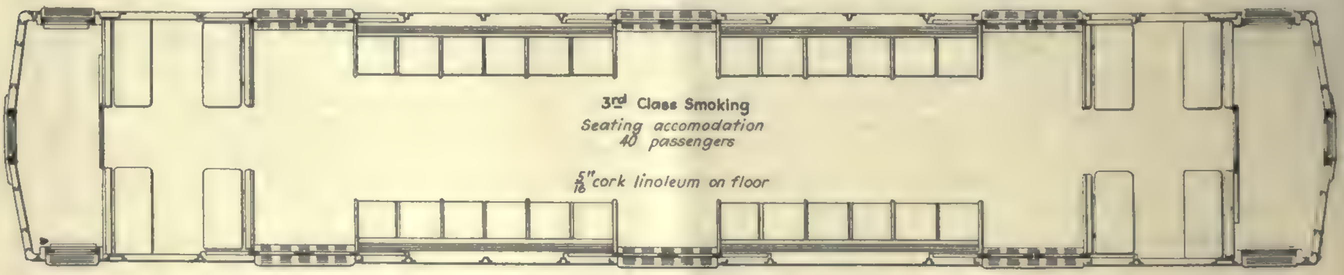
In the structural design of the bodies they have been treated as hollow girders, which results in economy of material and reduction of weight, without sacrifice of strength and stiffness. No truss-rods are employed to reinforce the car frame. Improved spring arrangements insure easy riding. The motor cars, being higher powered than their predecessors, will have both an increased speed and rate of acceleration. On "non-stop" runs a speed of 45 miles per hour can be attained. Improved braking equipment will help speed up the service by shortening the braking time.

By reason of their added width, these cars are much more roomy than the old. There are no straps, but hand rails and posts are conveniently placed at points near doorways and open spaces for the support of standing passengers. As an aid to patrons, the company has provided these cars with two sets of train indicators, one on either side of the center door. These contain the stations at which the train stops and a passenger can see at a glance before boarding the train whether or not a station stop is made at his destination.

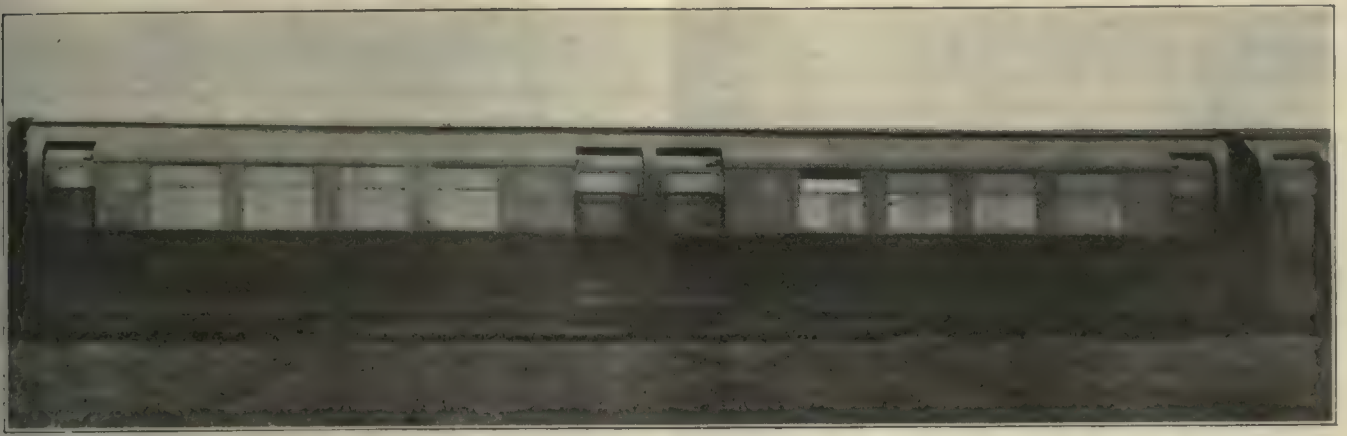


INTERIOR OF NEW PICCADILLY ROLLING STOCK

The London Electric Railway, as already mentioned, is also adding new rolling stock to its equipment of the Great Northern, Piccadilly & Brompton line. In order to increase the service on the three "tube" railways owned by the company, namely, the Great Northern, Piccadilly & Brompton, the Charing Cross, Euston & Hampstead and the Baker Street & Waterloo, all to six-car trains for the rush hours of the day, forty new


3rd Class Smoking
Seating accomodation 40 passengers
5/16" cork linoleum on floor

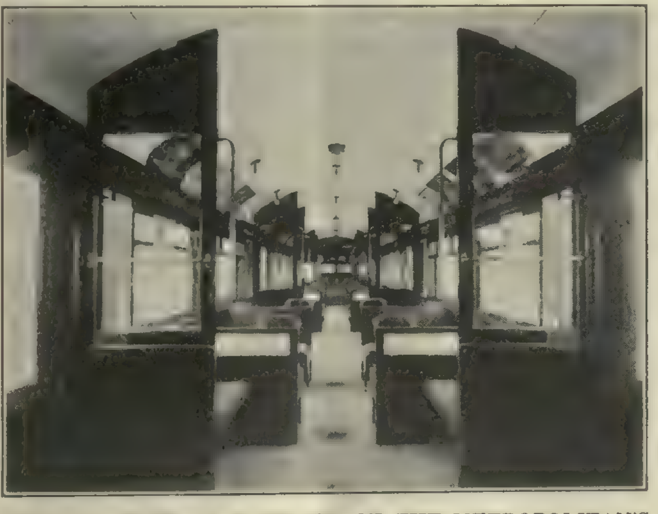
FLOOR PLAN OF METROPOLITAN DISTRICT RAILWAY'S NEW MOTOR CAR



NOTICE THE DOOR ARRANGEMENT ON THE CARS FOR PICCADILLY LINE OF THE LONDON ELECTRIC RAILWAY

trailer cars were ordered. The first four were delivered in December, and the remainder will follow at the rate of about two per week. The slow delivery of this equipment has been due to strikes and unfavorable industrial conditions. As fast as deliveries will permit, improved service is to be given by gradually building up a six-car train service during the peaks.

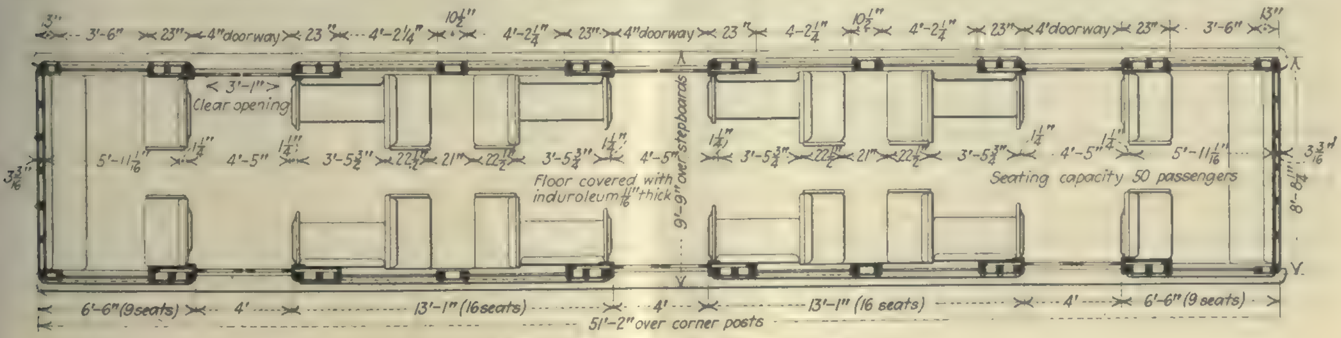
The general dimensions of the new cars for the London Electric Railway are almost identical with those now used, due to limitations imposed by tunnel section and curves. An elliptical roof replaces the clear story or monitor roof of the older cars. Special attention has been given to the lighting scheme, the lights being so arranged in groups of two down the center of the car as to provide well distributed illumination for passengers to read. Both the location of the lights and the restricted space allotted to roof advertisements have produced improved light reflection. Cross seats have been abandoned altogether, while the straps for standing passengers have been replaced by vertical poles. A great deal of attention has been devoted to the design of the seats. As a result a seat upholstered in pegamoid has been produced so that to be comfortable a passenger must sit upright and, at the same time, this decreases the tendency to block the standing area by drawing in his feet.



GENERAL VIEW OF INTERIOR OF THE METROPOLITAN'S LATEST ADDITION TO ITS EQUIPMENT

After a careful study with models of permissible door arrangements for the Piccadilly cars these have been fitted with a wide double-center door and a single door at each end. The middle door allows four people abreast to pass, while the end door permits but one person to enter or leave at the same time due to limitations imposed by the seat-box over the truck. Sliding instead of hinged doors have been adopted for the first time on "tube" railways. On account, however, of the low height of the car it has been necessary to extend the top of the door into the car roof. Because of this enforced construction, the doors could not be hung from the top in the ordinary way, but are carried on ball-bearing wheels running on the floor track, while rollers at the top act as guides.

The doors are all operated pneumatically by a device designed by the company's engineers, which presents several departures from standard practice in London, but which is similar to that followed by the New York subways. The front edge of each door is made of a resilient material on four cars already delivered. Experiments in this connection, however, have not yet been completed. As at present arranged the door edge consists of a channel section connected to a rod operating, through the door itself, to a clutch mechanism. If, while closing, the door strikes a passenger, the pushing back of the edge operates a three-way valve connected to the rod. The valve, when operated thus,



FLOOR PLAN OF METROPOLITAN TRAILER

reverses the direction of the door, which goes back to the end of its travel and then starts closing again. As a result of experience with the four cars delivered further experiments are being made with the view of making the sensitive edge still more sensitive. To do this, however, it is preferable to perfect the comparatively simple mechanical device that is already in use than to resort to some more complicated electric apparatus.

It is hoped with trains made up of these new cars to reduce the number of attendants other than the motorman to two per train, one at the front door of the rear car and one at the rear door of the forward motor car. Now five gatemen are employed with a six-car train, but under the new method the rear gateman will close all doors except the rear door on the front motor car, which is separately controlled by the other gateman. On each door is fitted a brightly painted yellow semaphore which juts out horizontally when the door is open, but is forced down out of sight by the door in closing during the last half-inch of its travel. The front gateman, on receiving the signal from the one in the rear and noticing all the semaphores pushed down, signals the motorman to start. By this means and with the aid of the ordinary platform staff it is expected that the length of stops at busy stations will be materially reduced.

In addition to the four trailers just received two of the older motor cars on the Piccadilly line have been converted to this arrangement, so that one train is in service with identical door control on each car. The railway regards this train in the nature of an experiment, and, as a result, certain modifications may be found desirable in the remaining new cars to be delivered.

Each of these cars seats forty-four passengers instead of fifty-four in the ones of older type. These forty cars will mean an addition of 26 per cent to the existing cars of the Piccadilly line and will provide 21,000 additional seats during the rush hours. They are built in the shops of Cammell, Laird & Company, in Nottingham, and cost about £120,000.

Interest in Trackless Trolleys Growing

THERE seems to be an indication of the revival of interest in the rail-less traction system, according to C. J. Jewell, Yorkshire Electric Tramways, Wakefield, England, in view of the heavy expenditure necessary in laying down the track structure for a street railway. Estimates for a street railway track are now in the neighborhood of £25,000 per mile of single track. Where the traffic is dense enough to warrant this expenditure, tramways are already being operated, but it is necessary to find some alternative method of furnishing other less densely populated routes with transportation service at a cost which will permit the giving of self-supporting and reliable service.

Leeds and Bradford are two pioneer cities which have taken up this question with a view to catering to routes that would not warrant the heavy capital expenditure of permanent way. Their experience with the trackless trolleys shows that notwithstanding the small seating capacity and the poor service, the costs of operation are much lower than the average cost of rail cars on these respective systems. Improvements to overcome these defects are now being made and it is expected that in the near future this method of traction will be considerably extended.

Electrification of Quebec Railroads Urged

The Present Period of High Cost of Coal Has Emphasized the Economic Necessity of a Definite Plan of Water-Power Development and Electrification of the Railroads in Canada

IN AN address recently given before the Rotary Club, Quebec, H. E. Weyman, manager Levis County (Que.) Railway, told why Canada, in the near future, would have to decide upon some comprehensive plan for the development of its water power and for the electrification of its railroads. He went on to say that in Central Canada, and especially in the Province of Quebec, there are no coal deposits, but nature has remedied this by providing enormous water powers. These at present are not being utilized to any great extent, but wasted while huge sums are paid to obtain coal from outside the country. Electrification in other countries, even those which have enormous coal deposits, has advanced to such an extent within the last few years that plenty of data are available on electric operation. Using the operating costs of the Chicago, Milwaukee & St. Paul Railway, Mr. Weyman showed how great an economy could be effected by similar operation of Canadian railroads.

Within the zone of the Province of Quebec 15,000,000,000 ton-miles of haulage is done by steam locomotives per annum. This requires more than 2,250,000 tons of coal per year, costing at present $8 to $10 a ton, the total coal bill therefore being from $14,000,000 to $15,000,000. This coal, purchased outside the province, has to be hauled from the mines on an average of 400 miles, involving about 700,000,000 ton-miles of non-revenue haulage, or 5 per cent of the total ton-miles of haulage per year.

The energy required to operate the railways in the zone mentioned would be about 720,000,000 kw.-hr. annually, or at the probable load factor the power plant capacity would be 100,000 kw. When it is considered that there are several water-power plants in the province of 300,000-kw. capacity, this figure appears comparatively insignificant. The total cost of power for electric operation would be about $7,000,000, as against twice that amount now spent for coal. Besides this electrification would save $1,000,000 annually, resulting from the elimination of non-revenue haulage.

All new railroads, said Mr. Weyman, to be constructed in the future should not only for their own but also for their country's sake be operated by electricity. Future development of white coal also demands that all electric power be standardized so as to permit power plants to be interconnected, thereby permitting a constant and reliable supply and giving the whole structure a solid financial footing. Thus the financing, development, rate of return and individual initiative would be assured no matter what abnormal conditions may come. Every one realizes that the past war resulted in injuring the credit of all public utilities and railroads. The whole question is huge, but certainly such a scheme as outlined will have to be undertaken.

American Engineering Council, the executive organ of the Federated American Engineering Societies, is making a study into the causes of labor unrest and industrial defects in the country as part of its effort to eliminate waste in industry. Herbert Hoover is president of this organization.

Old-Time Interest at C. E. R. A. Meeting

The Association Took Stock of Itself and Formulated Plans for Increased Activities, Which Are Calling for an Executive Manager and Separate Meetings for Engineers—Optimism Was the Keynote During the Entire Two-Day Meeting—Much Interest Was Shown in the Topics Discussed, Which Included Preservation of Line Poles, Service and Salesmanship and the Promotion of Traffic

IN AN annual meeting at Toledo Feb. 24 and 25, notable for the interest manifested, the high caliber of papers and constructive thinking and planning, the Central Electric Railway Association got back into its old pre-war stride. Right from the start, in President Robert I. Todd's address, a note of optimism and action was sounded, and this prevailed with constant strengthening to the end of the two-day meeting. Separate meetings for the engineers and an executive manager for the association are among the things which the executive committee will act upon by vote of the convention within the next sixty or ninety days.

Another important step taken was the vote of the meeting directing the appointment of a committee on merchandising transportation to devise ways and means of educating platform employees as the best medium through which to reach the public. The planning of a boat trip should also be mentioned, as it will renew interest in the summer meeting of the association.

ADDRESS BY MR. TODD

President Todd opened the meeting on Thursday morning with about 125 in attendance. In his address he spoke of the opportunity now, with the restoration of peace, for the association to take up its former activities. He pointed out that the 1920 membership included fifty-six railway lines, representing 4,711 miles of line, and, in addition, two steamboat lines. He reviewed briefly the activities of the association during the past year and suggested that the decision to have but two meetings annually instead of three, as heretofore, would seem to be a step in the right direction for the association to take. Continuing his address, Mr. Todd said:

The most important problem before the street and interurban railways at the present time is the restoration of their financial credit with the bankers and the investing public. Emerging as they now are from a period of depression and financial starvation due to a lack of co-operation and appreciation of their true situation on the part of the public, and, in many cases, a ruinous indifference on the part of federal, state and city authorities, the financial condition of many of those companies is very precarious. Yet without the financial oxygen, which was so freely administered by the Federal Government to the steam railroads and numerous manufacturing industries during the late world war, the electric railways of the country have heroically struggled for several years past for their very existence, all the time faithfully serving the public while their stockholders have suffered heavy, and in some cases, irreparable losses.

If our electric railways have thus shown such staying powers in the midst of what seemed insurmountable obstacles, is it not positive proof that with adequate fares and just regulation they will be able to render such service in the carrying of passengers and freight as will contribute perhaps more than any other one factor to the great upbuilding of our American cities and towns and play a most important part during the present and coming period of reconstruction?

This fact is recognized by some of the greatest financiers of the country, who have freely expressed the opinion that with proper rates of fare, electric railway securities will be among the most stable and solid investments anywhere to be found and compare favorably with municipal bonds and other first-class securities. If this be true, as it undoubtedly is, a great civic and moral responsibility rests upon rate-making bodies everywhere to see that such fares are allowed in the interest and welfare of the great body of the public and the growth and upbuilding of the cities and towns.

The fare question is one which is now engrossing the most careful attention of the heads of all electric railway companies. If those which are still solvent are not to follow the financial disaster which has befallen hundreds of others, rates must be allowed which will provide a fair return on the investment and afford means for efficient operation and necessary extensions. This must be done whatever the rate plan may be. City and state authorities sometimes fail to recognize this very evident fact, and very recently in Louisville, Ky., the federal court was appealed to on the ground that to require a company to furnish transportation facilities at a loss was confiscation of property. The court recognized the merits of this appeal and promptly permitted the company to charge a rate of 7 cents.

FEDERAL DECISIONS ON RATES

Recent federal decisions which make steam railroad passenger and freight rates in the states of Ohio, Indiana and Illinois conform with interstate commerce rates, namely, 3.6 cents per passenger-mile and approximately 40 per cent advance on freight rates, are bound to have a favorable effect upon interurban passenger and freight business either by diversion to the interurbans of many intrastate passengers or by giving basis for an increase in interurban freight rates and fares, or both.

In the readjustment of prices of commodities, in order to get back to normal conditions, it is clearly evident that labor must bear its fair share in the general reduction. An equal distribution of financial burdens is imperative if we are to reach a sound, economic basis.

THROUGH PASSENGER AND FREIGHT TRAVEL

A matter calling for our serious consideration is the development and encouragement of through travel over long distances without change of cars. Experience has shown that with proper facilities and publicity such service can be made very popular and profitable. Where such service has once been established, and for one reason or another temporarily discontinued, it has taken great effort to reestablish it. We believe that through, fast interurban trains are in demand, particularly between points where steam railroad trains are infrequent and unsatisfactory. Excellent through interurban service is now being furnished by some of our member companies. Perhaps the greatest recent development along these lines is that inaugurated by the Interstate Public Service Company of Indiana, which has just added to its equipment a number of handsome and commodious steel passenger cars with trailers which run at frequent intervals between Indianapolis and Louisville.

No less important from a revenue standpoint is the operation of through freight and express cars which will avoid the delay and loss caused by transferring shipments en route.

Local freight service should also be improved. If interurban companies are to recoup their passenger losses on account of automobile travel, they will find it imperative to greatly develop their freight business. This fact I think is recognized by all.

A committee of this association is already considering motor truck competition and will make its report in due time.

While we are now passing through a period of "hard times," the future is full of promise. No line of industry has had to bear more burdens during the last few years than the electric railways of this country, and no industries have shown more grit, loyalty and determination in the face of what seemed almost insurmountable obstacles. This gives hope for the future, so much so, that President Gadsden of the American Electric Railway Association in a recent address assured us that:

"With the revenues of electric railways adjusted so as to cover the cost of operation and provide an adequate return upon investment at all times, the credit of electric railways, provided we have the proper financial structures, will rank next to municipal securities."

SERVICE AND SALESMANSHIP

After a few minutes devoted to the business of the association, James P. Barnes presented a paper on service and salesmanship, which was very enthusiastically received. In the course of the discussion which followed the association voted to have the paper printed and given a wide distribution among the association members and employees. The paper appears in full elsewhere in this issue.

One of the points made by Mr. Barnes which evoked a good deal of discussion was that the employees of a railway company formed the most effective means through which to reach the public. C. L. Henry, president Indianapolis & Cincinnati Traction Company, agreed with Mr. Barnes that this was the best method of developing good relations with the public, but that it was the very hardest plan to carry out. He spoke rather hopelessly of the difficulty of educating the platform men and suggested that Mr. Barnes write another paper telling just how it could be done. Mr. Barnes retaliated, good humoredly, by saying that if he had a definite plan for doing this he could sell it.

S. B. Hutchins, Westinghouse Traction Brake Company, suggested that something could be accomplished by calling in a few of the best platform men and talking with them about the suggestions in Mr. Barnes' paper, with the idea that they could be asked to bring up the matter in employees' meetings and induce their understanding and co-operation.

Prof. D. D. Ewing, Purdue University, said that much could be accomplished, in his opinion, if the association would maintain a bureau of facts which could disseminate information generally to the newspapers and could function as a source of reliable information upon which the public press and civic bodies could call. He said that the greatest need was to overcome the publication of misinformation and that this bureau might serve as an important corrective measure.

M. B. Lambert, Westinghouse Electric & Manufacturing Company, expressed the feeling that where there is a will there is a way to accomplish the co-operation of employees. He contended that the problem is that it is not so much the ignorance of the trainmen and the people generally as it is that they know so much that is not so. He spoke of the American Electric Railway Association work along the line of merchandising transportation and said that the first phase of the work which the committee assigned to that task is to take up is that of training the employees. He then suggested the appointment of a C. E. R. A. committee on merchandising transportation, whose duty it would be to devise ways and means of educating the employees, and then put this in the form of a motion, which was passed by the association.

A. Schwartz, Toledo Railways & Light Company, suggested that a committee be appointed to work up effective posters for use in the cars of the member companies, but this was not acted upon.

Thursday Afternoon Session

A motion picture, "From Tree to Trade," was shown at the opening of the afternoon session in conjunction with a paper by R. R. Cunningham, Long-Bell Lumber Company, Indianapolis, Ind., on the "Conservation and Preservation of Line Poles." In his paper Mr. Cunningham reviewed some of the fundamentals in connection with the preservation of poles by treating with creosote and cited the long life which has been derived as a result. He also explained the process of treating used by the Long-Bell company, which consists of first subjecting the timbers after air-seasoning to a pressure treatment of creosote in a closed tank, followed by the application of a vacuum for withdrawing practically all of the surplus oil from the timber. In answering a question he explained that this method had been found to be more effective and less expensive than the earlier process wherein the timber is first subjected to a vacuum, followed by the pressure treatment.

THE FUTURE OF THE C. E. R. A.

The association then entered upon an extended discussion of the Central Association, which was in the nature of taking stock of the position of the association and what its future course should be. President Todd called upon C. L. Henry to start the discussion. Mr. Henry commented that he had watched the development of the association from its very beginning and expressed the feeling that its career had been about as perfect as human minds could make it. He said its activities had always been marked by harmony and unity of purpose, to which might be attributed much of the success attained. He said it was about the first association to take in the supply men and manufacturers as members and that this act had been a great success. He urged, now that the number of meetings had been reduced to two, that they should each be made unusually strong. He thought the summer meeting should be attended by as much pleasure and fun as possible, and that the winter meeting should include a banquet at which the biggest men in the industry should be secured to speak. He also recommended that there should be a meeting of the executive committee in between these two regular association meetings.

He spoke of the strength and accomplishments of the subsidiary traffic association and suggested a wider work. He expressed the opinion that the railways embraced by the association are on the eve of a splendid development in the freight, express and passenger transportation business. He said it was remarkable how much preference people show for interurban travel, and mentioned the action of the Indiana farmers in securing the passage of a state law permitting the hauling of live stock through the streets of any city in the state in interurban cars. He declared that the harvest is now ripe and that the electric lines can secure a splendid increase in all classes of business if they go after it. He also urged that there should be further standardization.

Turning his remarks to present conditions, Mr. Henry vigorously admonished the manufacturers to bring down the prices of equipment. He contended that there cannot be any success in the electric railway business until the manufacturers take this course. He cited an instance where a manufacturer had written urging that the railway give an estimate of its requirements for the following year of a certain material, in order that the manufacturer might be in a position to meet them and stating that the price was so much and there was no prospect of any lower price. As the material had been satisfactory and the company desired not to make any change, the company promptly placed an order. The next day a letter was received from the manufacturer quoting a price of 10 cents a pound less than that at which the order was placed and saying there was a supply on hand for immediate delivery.

Mr. Henry spoke of the great reductions in the prices of raw materials and contended that these reductions had not been passed along to the consumer purchasing manufactured articles. His remarks were general in character and applied to manufacturers in general lines of merchandise as well as to those supplying the electric railway field, his criticism being that all along the line they were not willing to bring prices down. But he warned that they would have to for the people had stopped buying, citing as an indication of this fact that on his property alone, the tonnage shipments of freight had been 34 per cent less in last November than in the corresponding month the year before, 38 per cent less in December and 40 per cent less in January. He insisted that the manufacturers have got to come down, that the people will not purchase freely until prices are properly adjusted.

M. B. Lambert explained that Mr. Henry's wail is virtually the one which the manufacturers are making to those who supply the raw materials, and to the railroads because of the extremely high freight rates and passenger rates, and to the hotels and all along the line. He referred to the determined effort which the manufacturers are making to bring about lower prices and said that his company, the Westinghouse Electric & Manufacturing Company, was following the lead of its bigger contemporary with a 15 per cent reduction in wages. He thought Mr. Henry's criticism was too broad in character and said that it would be impossible for the manufacturers to make wholesale reductions, but that they were hoping that broad economic conditions would bring prices down and that they were doing everything possible to hasten this time.

C. E. Sawtelle, Tool Steel Gear & Pinion Company, endeavored to show that the labor cost is the determining factor in the prices of material and equipment and explained that the living costs of employees have decreased but very little and that it was not fair to make material reductions in wages, and that until this were possible it would be impossible to make marked reductions in the prices of gears.

L. G. Parker, Cleveland Frog & Crossing Company, said the manufacturers in the steel industry are using the best minds in an effort to bring about price reductions. He quoted a prominent steel man as saying that perhaps the best way to reduce prices was for them to sell below cost, for, judging from past experience, they would then find a way to produce below that price. Mr. Parker also pointed out that it is the consensus of opinion in the business world that, first, prices will never return to the pre-war basis, and, second, that the new normal price will be from 40 to 50 per cent above the pre-war basis, on account of the increase in taxes, the new level of wages, the higher railroad rates, etc. He pointed out that the price of steel is coming down, and that as this affects nearly everything else there will probably be seen in the next six months a gradual reduction in the prices of manufactured articles in general.

Getting back to the discussion of the future of the association, Harry Reid, president Interstate Public Service Company, proposed the employment of an executive manager for the association whose primary job it would be to execute the work of the association. He indicated that this matter would be taken under consideration by the executive committee at its next meeting.

S. W. Greenland spoke of the reorganization of the National Electric Light Association and the engagement of an executive manager and said that while this had resulted in an increase in dues of 100 per cent, he had paid the present dues more cheerfully because he was getting more out of the association. He thought that such a man in charge of the Central Association work would be able to get a great deal more out of the committee activities than is accomplished at present, and he should also be a person competent to supervise the work of committees.

George H. Kelsay, superintendent power and shops, Cleveland Southwestern & Columbus Railway, made a plea that the engineers be given some form of organization whereby there could be a greater and freer exchange of ideas and experience. He commented that it would seem that the work of the engineers was just as important as that of the traffic men and accountants, who now have separate subsidiary associations. He referred to the success of the meetings of the Association of Electric Railway Men, which comprises the mechanical men of Ohio and Pennsylvania.

H. A. Nicholl, general manager Union Traction Company of Indiana, thought that the association had taken a step in the wrong direction when the number of meetings was changed from three to two and that, if anything, a change in the other direction would have been desirable. He also commented that the meetings were characterized by too much discussion by executives and recommended that programs be arranged for the men who actually are in charge of the operation of the properties. He thought that such programs would be conducive to better results from the association meetings. He suggested that an opportunity be given men who are reticent about speaking to prepare their discussion of papers in advance. He also urged that men should not accept appointment on committees unless they intended to do their share of the committee work, not expecting the chairman to do it all.

An engineer for one of the traction companies expressed the view that under the present arrangement the engineers have practically no voice and they feel that it is not worth while for them to attend the meetings. He said that the upkeep of the cars is exceedingly important, for they are the stock in trade of a transportation company and he felt that the equipment men had not been getting proper encouragement in their work from the higher officials.

Professor Ewing also indorsed the idea of a subsidiary association for the engineers and operating men, for it seemed to him that the men responsible for the actual operation of the properties were not having a voice in the developments made through the association. He thought it was desirable to have some form of meeting where it would not be necessary to write a paper or to make a speech in a formal meeting, particularly in the presence of the boss.

In order that this matter, which had already been proposed at several previous meetings, should receive definite consideration, Mr. Kelsay made a motion, at the suggestion of M. B. Lambert, that a committee be appointed to report to the executive committee a proposed plan for meetings of the engineers. This motion was passed. While it was before the association, Mr. Hutchins remarked that now that all of the "commendations and indictments" had been expressed, he wanted to urge the adoption of some plan which would bring the engineers back into the meetings. He felt that in the past the work of the standardization committee had not been properly encouraged and that it had fallen down for lack of support.

Mr. Henry moved that the president be requested to call a meeting of the executive committee in the interim between this and the next meeting to consider the various matters which had been suggested, and the association so voted.

Friday Morning Session

In the absence of Mr. Todd, A. C. Blinn, first vice-president, presided at the morning session on Friday. A paper on traffic building was read by Bert Weedon and followed by prepared discussions by L. M. Brown, F. D. Norviel and J. H. Crall. These papers will be published, in abstract, next week.

C. O. Sullivan, traffic manager Western Ohio Railway, Lima, Ohio, emphasized the importance of co-operation between the transportation and traffic departments. He said that the traffic men must know about the limitations and capacity of the transportation department when they go out to get business so that they will not contract for business which will result in a loss to the company, or make promises which the transportation department cannot perform. He also thought that the traffic men ought to be in a position through their contact with the public to make valuable suggestions to the transportation department as to schedules and service.

C. L. Van Aucken, editor *Electric Traction*, prepared a discussion which was read by Mr. Henry, in which he emphasized points made by Mr. Weedon that the traffic man must know his competition and that his success depends on the service he has to sell. He said that the transportation department should turn heaven and earth, if necessary, to carry out the promises of the traffic department. He suggested that perhaps better co-operation between departments could be secured by having the men work a certain length of time in the other departments and by having frequent conferences. He told the traffic men to keep out of their swivel chairs except after 6 p.m.

In response to a question, Mr. Weedon said that more money could be made in handling carload shipments than l.c.l. merchandise. A careful study of the cost of handling l.c.l. shipments on the Interstate lines had shown that the best that could be done was to break even on this class of business, when a reasonable return on the equipment and property used was included. He spoke of the recent installation of overnight freight service between any points on the line between Indianapolis and Louisville and said that this resulted in an increase in the first thirty days of something between 30 and 40 per cent. As to how more business could be secured, he said that it was purely a matter of service, and that whatever success is attending the efforts of the Interstate Public Service Commission is entirely a result of trying to give the communities what they want.

Mr. Greenland spoke of the need not only to get revenue but to conserve it after it is earned. He said that during the war, when business was very heavy, there had been many claims for damages and lost freight. The number of such claims had been greatly reduced and a much better feeling toward the company created by arrangement for handling such claims promptly. A special man was assigned to the task of investigating each claim and settling at the first possible moment. He said that in some cases the company had actually paid for damages before investigating a claim, where it was reasonably sure that the claim was correct. Mr. Greenland commented that if a settlement can be made before a claim is entered it results in the development of an excellent feeling. He felt that this prompt settlement plan was one of the best things his company has done.

EXCESS CHARGE ON FARES

Commenting on the proposal in the paper by J. H. Crall to collect an excess charge where cash fares are paid on the cars, Mr. Blinn said that 10 cents additional was being charged for cash fares on the limited trains of the Northern Ohio Traction & Light Company, but he was surprised to hear that the Ohio Electric Railway was refunding this additional charge, and he wondered upon what theory this was being done.

Mr. Sullivan explained that the Western Ohio Railway has been charging an excess of 10 cents for more than two years and refunding the charge where application is made for it, to comply with the order of the utilities commission. Before the 10-cent excess charge was inaugurated, the cash receipts of the company were 60 per cent of the total receipts, but within three months after the excess charge was inaugurated this was cut down to 20 per cent. In other words, the plan was effective even though the excess was refunded. The reason the commission ordered the refunding of the excess was that if it were not refunded it would be equivalent to a rate of fare in excess of 3 cents per mile, which was the limit set by law.

J. F. Starkey, Lake Shore Electric Railway, said that his company was charging an excess for payment of cash fares. The present tariff provides for a ticket fare of 2.7 cents per mile one way, or 2.5 cents per mile for round trip, and 3 cents per mile for a cash fare paid on the car. He raised the question of whether it would not be advisable to petition for a cash fare rate of 3.6 cents per mile, or equal to the steam road rates, and retain a ticket rate of 3 cents per mile. In reply Mr. Blinn commented that he was afraid that a general increase to 3.6 cents per mile on the interurban lines would result in diminishing earnings. Mr. Sullivan said that some of the Ohio lines were now taking up this question informally to see whether they cannot file a cash fare tariff of 3.6 cents per mile, leaving the present 3-cent rate in force for ticket fares.

Another member said that in Michigan the legal rate of fare is 2½ cents a mile, and as the interurban companies are charging this limit at the present time, it is impossible for them to impose a 10-cent excess charge for cash fares. He also spoke of soliciting freight business by going through a manufacturer's plant and seeing what he makes and then trying to get him to do business either with a consumer of his product or a producer of his raw materials located on the interurban line.

MOTOR TRUCK COMPETITION

P. H. Conroy, Tool Steel Gear & Pinion Company, brought up the subject of motor truck competition and said that the manufacturers should co-operate with the electric lines in educating the public to the true situation in this connection. He pointed out that it costs 300 per cent more to build highways today than it cost thirty years ago to build railroads. He said also that the maintenance of these highways is two or three times as great where they are subjected to heavy trucking as it is where they are used only for pleasure vehicles, and the people should know this. Referring to Mr. Weedon's comment on the absence of profit in handling l.c.l. shipments, he said that the cost could be reduced by greater volume of business, because the same crew can handle more cars with the same labor cost. One way to get a greater volume of business is to arrange for more interchange between companies.

Mr. Greenland said it might be well for the companies generally to take up the slogan adopted by one company of "Ship by Trolley and Save the Highways." C. J. Munton, president Fort Wayne & Northwestern Railway and receiver of the Winona Interurban Railway pointed out that perhaps the association members should go slow in condemning automotive vehicles and the use of the highways for shipping, for they may want to do this themselves later on. He said that his company was considering the advisability of connecting up all the small towns within a radius of 15 or 20 miles with motor bus and motor truck lines, acting as feeders to the electric line. He said that these motor bus lines may show no profit in themselves, but will contribute to the gross business of the electric line, which can be done profitably. He said that one line will probably be established in the near future to try it out, a line which will operate over a state concrete highway and serve a community which now has no way of making direct shipments to and from Fort Wayne. It now takes one week to get a freight shipment from Fort Wayne to this point, only 30 miles away.

T. A. Ferneding, general manager Dayton, Springfield and Xenia Southern Railway, said that the motor truck people should not be permitted to operate in competition with the electric lines without being forced to pay a proper tax for the use of the road. He contended that this was unfair competition, for the electric lines contribute very heavily through taxes to the cost of road construction, from which the motor truck companies under present conditions derive full use with almost no charge. If the motor truck company must pay its share it cannot exist on a fair competitive basis.

Mr. Starkey commented that a number of truck companies in competition with his company had started in business, but that most of them had failed and ceased to operate. He also spoke of an ordinance passed in Sandusky which placed the jitneys under control and caused them to disappear. In this case the ordinance was drafted at the invitation of the city. He also expressed a skeptical opinion on the advisability of increasing electric rates to the steam road level. He believes the interurbans are doing more business now because of the high steam road rates.

Mr. Barnes expressed the view that the companies should find out what the people want and give it to them. He thought that it would be impossible to make any one pay for the use of the public road, for the freedom of this is an age-old custom which cannot be changed in a few years. He referred to the paper presented at Atlantic City last fall by George M. Graham, vice-president Pierce-Arrow Motor Car Company, in which the industry was asked whether it would have the automobile as an ally or competitor. Mr. Barnes said that every means of transportation is our means of doing business, but in this case it was a question of whether we would have co-operation or competition. He thought the former was much better, and said that it was freely offered by this prominent manufacturer, who probably voiced the feeling of the automotive industry, and that it was up to us to make a choice, but that we must do it soon or the opportunity would pass.

ELECTION OF OFFICERS

In his annual report Secretary-Treasurer L. E. Earlywine pointed out that the financial status of the association is the best since its organization. C. L. Henry, chairman of the nominating committee, then made the following report on officers for the ensuing year, which was confirmed by the association:

President, A. C. Blinn, vice-president and general manager Northern Ohio Traction & Light Company, Akron, Ohio; first vice-president, S. W. Greenland, general manager Indiana Service Corporation, Fort Wayne, Ind.; second vice-president, G. T. Seely, vice-president and general manager Pennsylvania-Ohio Electric Company, Youngstown, Ohio.

For members of the executive committee the following were named: F. D. Carpenter, R. I. Todd, C. L. Henry, H. A. Nicholl, C. N. Wilcoxon, W. S. Rodger, F. W. Coen, J. F. Collins, Harry Reid, H. C. DeCamp, W. D. Hamer and A. R. Baxter.

In accepting this office Mr. Blinn made a few remarks which are reported in the personal columns of this issue. He then brought up the subject of the summer meeting and said that there was such a general feeling that the association should again have a boat trip that he would like to have the matter discussed at this time. He then appointed the following committee on arrangements: S. D. Hutchins, Westinghouse Traction Brake Company, Columbus, Ohio, chairman; Harry L. Brown, ELECTRIC RAILWAY JOURNAL; John Benham, International Register Company; L. E. Gould, Economy Electric Devices Company, and C. Dorticos, General Electric Company.

Mr. Henry expressed himself as being strongly in favor of the boat trip, saying that the association had never hit upon anything which was so completely satisfactory from both a pleasure and business standpoint as the boat trips which had been taken in previous years. After other enthusiastic discussion a motion was made directing the committee to determine at the earliest possible moment whether the boat trip could be had without prohibitive cost, and if so that the boat trip be adopted as the plan for the summer meeting. This was unanimously adopted on a rising vote.

Railway Electrification in Japan

THE Department of Railways of Japan, satisfied that railway electrification has been already tested out in that country sufficiently to assure success, proposed a bill last July in the Diet for the completion of the extensive power system along the Shinano River. According to a statement in the *Trans-Pacific* this bill, calling for an expenditure of 100,000,000 yen, failed by a narrow margin, although railway officials foresee the consummation of their plans in the near future by presenting it in a different form. The development of this project will permit the electrification of about 400 additional miles of Japan's state railways. The scheme for widening the gage and the alternative for double-tracking were both dropped early this year.

Sincerity, Service and Salesmanship*

A "Sermon" on Relations with the Public — The Best Way to Reach the Public Is Suggested by the Expression "One of the Conductors Told Me, and He Ought to Know"

By JAMES P. BARNES
President Louisville (Ky.) Railway

AT THE midyear dinner of the American Electric Railway Association former Chairman Wilkerson of the Illinois Public Utilities Commission talked, straight from the shoulder, the kind of talk that railway operators need today to hear and ponder. His address followed a day devoted to the presentation of papers dealing with all phases of electric railway finance. President Gadsden in closing the business session of the meeting spoke most earnestly of the loss to the industry which resulted from the failure of association members to discuss fully and vigorously the subject matter of papers and resolutions placed before them for consideration. His remarks were especially apropos, for the association had just adopted by viva voce vote and without discussion what is probably the most important and far-reaching resolution that has ever come before any of its meetings. The report of a special committee on the findings of the Federal Electric Railways Commission and the public utilities committee of the United States Chamber of Commerce had just been adopted, and by it the association bound itself to, first, a recognition of the fairness and soundness of the analyses in these reports; second, a recommendation to electric railways to accept these reports as a working basis, and, third, a policy of the most complete service at the lowest possible profitable fare.

Here are three planks which, taken with the code of principles adopted by the association in 1914, form a platform of complete frankness and uprightness in dealing with the public. And now arises the pertinent question: "What shall we do about it all?"

Many of the men in this room were in attendance at Atlantic City when that code of principles was adopted and all of us remember the publicity it obtained. The code was adopted without dissent and bound the association, among other things, to a policy of "full and frank publicity—to the end that proper information may be available to the investor and the public." Again the pertinent question: "What shall we do about it all?"

That was more than six years ago. What did we do about it? Was there a general adoption of the policy of "full and frank publicity" regarding company affairs? Was all proper information made available to the investor and the public? Will we now wholeheartedly adopt the policy laid down in our resolution of latest adoption and sincerely meet the public representatives on the program laid down in the two reports of the federal commission and the United States Chamber of Commerce?

If we do not do these things then the time has come for us to hand in our resignations and let our better qualified successors be chosen, for only on the basis of fair-minded, clean-handed open dealing can the traction problems of this country be solved in the future.

Mr. Wilkerson in the address referred to summed up our situation in the language of a man familiar with that of which he spoke and toward the close of his address made this significant statement:

> You must organize and you must fight. I know that some good work has been done, but I know that you will pardon me when I say that my observation has been that it has not been carried on with the zeal that the righteousness of the cause requires . . . There is need for straightforward and emphatic expression. . . . You must reach the people. . . . Make no mistake. The courts cannot save you. . . . If you get the people back of you, if you can convince them that you have been right and are right . . . they will take care of the politicians and the dishonest newspapers.

Here, summed up in the words of a thoughtful, experienced utility commissioner, is the golden rule for the conduct of a great public service. Built on the foundation of right, honesty, fair dealing, and good service, the structure of our utilities shall stand and serve as long as society requires transportation.

HOW SHALL THE PUBLIC BE REACHED

Now it is one matter to say "convince the public that you are right" and quite another to do that thing. But it is not impossible. Here applies with double force Mr. Wilkerson's criticism of our lack of zeal. Often have we overlooked the obvious and neglected the available means of carrying our problems home to the people we serve.

Chairman Jackson of the board of trustees now operating the Boston Elevated Railroad recently remarked that in his two years on that board he had received and reviewed many service complaints of all shades of intolerance and criticism. "But," said he, "I do not remember ever to have seen a complaint from a motorman or conductor of the treatment he had received from a passenger." The universal application of this expression of the one-sided practice of patience involved in everyday service will be recognized by every railway operator. Truly, compared to many of the uniformed men whose daily life consists largely of "fares, please," "transfer?" and "please step forward," Job was an amateur.

Many a superintendent and instructor has concluded his remarks to the new employee with "and remember when you get out on your car and go up against the public you've got to be prepared to co-operate for two." And generally the instructions are well received and thoroughly executed by the "boys in blue," who, after all is said, compose the forces which wield for better or for worse that powerful two-edged sword of public opinion.

We are prone to forget these first-line troops of ours, however. We forget that they are in action day after day and the impression made by that parting injunction of the "super" will not forever outwear the friction of continuous contact with the riding public. Most men mean to be cheerful in the course of their daily concerns, but on the back platform especially one's inclination in this direction frequently suffers purely from lack of example. Example is better than precept, and the need of an example of cheery compliance with the law of service for the greatest convenience of the greatest number must be met—if not by the public then by the public servant.

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*Address presented at the annual meeting of the Central Electric Railway Association, Toledo, Feb. 24, 1921.

We are all prone to forget how many passengers form their opinion of a company solely from the treatment they are daily accorded by its employees as they travel to and from their places of business. Public opinion—much considered and discussed but too elusive and intangible for definition—is nevertheless the foundation of successful traction, and properly to understand and analyze its qualities we must know what it says and whence it springs. Its criticisms must be met fairly and openly and, when just, satisfied. The example of cheerful and respectful hearing, consideration and action must come from the officers and be carried down through subordinates to the men actually in close daily touch with the public, whence spring these criticisms.

More fully than has been generally recognized the public opinion of this industry is the opinion of the people who ride. Too often our ears are open and our attention alert to catch the comment of the so-called "influential citizen," and too seldom to heed the complaint of that great body whence come the 5, 6 or 7-cent increments of our life's blood.

Too often are our explanations and appeals directed to the ears of the few and not to the many who are the riders and supporters of our business. Too often are we in the position of the large retailer whose trade is cosmopolitan but whose advertising is carried in the medium of exclusive circulation. We tell our troubles to the banker, the financier, the manufacturer, and forget that time-worn expression, "Tell it to a policeman, everybody's friend."

Our message is, and must be if it is to be successful, for the ears of everybody. When everybody has full information and all reasonable explanation of mooted points Utopia will not, perhaps, be realized, but at least, we shall be better off than now. Not until we get this habit in thought and in deed of "telling it to everybody" will we get our message completely across, and even then we may have all the trouble, and more, that Peter Grimm had with his comparatively simple story.

We serve the people more frequently and more personally, perhaps, than any other utility, and we must understand and be understood if the great intangibles, "public convenience and necessity," are to be allies instead of enemies.

We err if we do not grasp every opportunity and utilize every agency to bring about the complete understanding of and sympathy with our problems which must be the foundation of that magnificent superstructure—co-operation—which is the design and aim of us all. We have suffered much and learned much in the trying times of the last few years. Bitter lessons and costly have been ours, and to the credit of the industry be it said that they have been learned with a maximum of fortitude and a minimum of complaint.

The sun of optimism which peeped through the clouds of adversity at Atlantic City last October for the first time in many weary months has been encouraged more than by any other thing by the work of our association and individuals in bringing about public understanding of our situation. We have learned to use the association, the committee reports, the newspapers and many other agencies of publicity, but have we not neglected the most useful and the most available agency, perhaps because it lay at our very door?

MAKE THE MOST OF THE TRAINMEN'S PUBLIC CONTACT

We enjoy in marked degree the privilege most eagerly sought by all progressive sales organizations—that of frequent (in our case almost continuous) contact between our sales force and our customers. Twice a day do most of our customers transact business over our fare-box counters, and each time an opportunity is presented for the making or unmaking of favorable opinion of our business methods.

Every street car conductor is a salesman for his company, and upon his handling of his passengers depends the quality of public opinion for the particular group that he meets. More frequently than we realize the platforms of our street cars become the public forums for discussion of the good and ill of street-car service, and many an opportunity is opened for the well-informed man to correct popular misunderstandings, and interject the "soft answer which turneth away wrath." A phrase or sentence here or there is passed on until it reaches the dignity of the oracle backed by the authority of "one of the conductors told me, and he ought to know." There's the rub—He *ought* to know—but do we always give him the opportunity to find out? A well-informed conductor becomes a boosting publicity agent if his information consists of sound ideals of service; and if it doesn't we had better change the ideals, and do it quickly!

To mention only one of many matters prominent in the platform discussion may illustrate: Rates of fare and transfer rules are based upon reasonable considerations, else commissions would not permit their continuance. How often is the street-car platform discussion of the questions enlightened by true explanation, based on facts? Not often enough. Then whose fault is it? What would we say in criticism of the sales manager who sent his salesmen out to sell without first making sure that the nature and prices of their goods were understood by them? What would we say of the sales manager who assigned to his men no reasons for the rules and regulations under which they must sell their wares? Is it sufficient reason that the orders read thus and so, that there need be no reason for the orders? And if the reason is a good one, does not the telling of it strengthen the order? Publicity never weakened a righteous cause or lost a just fight. The reason why can still the fretful "why not."

Those from whom we would have frankness in dealing are entitled to frankness in return, and if rules, rates or regulations are attacked then, in all fairness, we should furnish ammunition for defence or revise the offending text.

A famous hotel-keeper has built a fortune around the text "The guest is always right." Present-day methods in mail-order houses, department stores and other concerns dealing directly with large numbers of individuals have prospered by similar means. How much good will has been added to the nation's daily life by the inclusion of the word "please" in the invariable telephone greeting from central? How much more might be added if the nation's street-car business were put on a corresponding plane of "the voice with the smile"?

Truly, our sales problem has become that of selling ourselves to our employees. If we truly stand on the platform of the best service to all comers we will turn our attention and our best efforts to the problems of selling this ideal to ourselves from top to bottom of the organization. Let every street car be a mart where service is measured by the Golden Rule, and there will be service and satisfaction run together to the goal of public content and a new dawn will break over the industry.

In another sense have we a sales problem. That of selling our proposition to ourselves! Deliberately I say that we do not know all that we should of our own properties and problems and those of our neighbors. No railway man with open mind can take his pair of eyes and pair of ears to such a meeting as this without bringing back ideas gleaned from his fellows, which will improve his own operation. That man who has reached a point where he feels his operation is not susceptible to improvement has indeed started backward and we may eliminate him from our discussion as the industry will eliminate him from its ranks.

It would be strange indeed for a newcomer in the ranks of this association, known throughout the country as an active, effective, working unit, and a monument to its builders, to come forward with suggestions or criticisms regarding its plans and methods. Criticism is far from my purpose, and suggestion in concrete form is beyond my capability. This is the first C. E. R. A. meeting I have been privileged to attend. My reference to association activities must then be in general terms and in form of inquiry.

Are we, in this association, doing all we can to serve as a clearing house for information so that our membership may be kept advised by correspondence, by discussion, and by personal interviews of the kaleidoscopic changes of daily occurence in our territory and throughout the country? Are we giving to our subordinate officials all the opportunities that could usefully be given for interchange of ideas and mutual improvement? Are we furnishing the means for the experience of each of us to be made quickly, fully and intelligently available for the good of all? Are we providing means for the application to any particular problem, local or general, of the averaged and balanced results of the experience of all of us?

If these things are not now being accomplished then our discussion of the future of the association should surely take the form of a discussion of ways and means to bring these things about that each may assist all, all assist each and the whole plan of our activities run to the one ultimate object—Best Service to the Public.

Superpower Plans Outlined

Secretary Payne Explains in Progress Report the Present Requirements, the Expected Savings and a Possible Financial Plan—Complete Report Expected to Be Finished by June 30

ON FEB. 24 Hon. John B. Payne, Secretary of the Interior, submitted to President Wilson a progress report on the superpower survey being conducted by W. S. Murray and staff as part of the work of the Geological Survey. The complete report, it is expected, will be finished by June 30, 1921.

According to the preliminary report the survey has found that there are in the area under consideration 14,500 miles of track of Class A steam railroads, 36,000 miles of total trackage and 10,000 steam locomotives and that there was a total coal consumption for railroad purposes during 1919 of 19,000,000 tons. About 33 per cent of this trackage can be economically electrified and this mileage will carry from 50 to 60 per cent of the traffic. This electrification will mean an annual saving of 6,000,000 tons, or $40,000,000, besides an annual saving of $50,000,000 in engine repairs and maintenance. The total cost of this electrification would be $40,000 per mile of main track, which for 12,000 miles would be $500,000,000, and $300,000,000 for tracks and siding electrification. There would be a salvage of $150,000,000, and the return on the $650,000,000 required would be approximately 14 per cent on the investment.

It is expected that the superpower system in 1919 would have saved the industries in the area mentioned between six and eight million tons of coal and that by electrification the anthracite mines would have saved 6,500,000 tons in addition. The utilities in the section covered by the survey use 8,000,000,000 kw.-hr. of energy generated from coal at an average coal consumption of 2¾ lb. per kilowatt-hour. The expected reduction to 1¾ lb. by the superpower plan would effect an annual saving here of 4,000,000 tons annually.

Water power available in the zone could supply 12,000,000,000 kw.-hr. and for a minimum year 8,360,000,000 kw.-hr., the plant capacity required being 2,300,000 kw. It is expected that in 1930 the total requirements will be 48,000,000,000 kw.-hr., of which the superpower system could supply 36,000,000,000 kw.-hr., so that the water power supply in the ultimate system can be but from 20 to 25 per cent of the total.

FINANCIAL PLAN CONTEMPLATED

The financial plan in bare outline provides for a superpower company with a non-par stock as its only class of security. The public utilities within the Boston-Washington zone would be entitled to subscribe for this stock pro rata, based upon capacity demand, and load factor and stock not taken by these customers of the superpower system will be offered to public subscription.

A contract between the superpower company and a local public service company would be a selling contract or a buying contract, while in many cases both buying and selling of current would be involved. These contracts, on which the state regulatory bodies would pass, would be adjusted from time to time to meet the progress of the art and changing conditions, whether favorable or unfavorable to costs of operation. Returns upon the stock of the superpower company, according to the plan, should be limited by specific provision to a fair division of the benefits derived from its operation between the investing public and the consumers. This division would be attained by a rule under which the customer companies shall participate equally with the stockholders in any distribution, at stated intervals, of net earnings in excess of a specified rate of return, which itself should be more liberal than is commonly contained in the idea of public regulation. Thus efficiency in management would be rewarded and the public interest directly served. To secure the participation of the ultimate consumer in this division of benefits it is suggested that the superpower stock held by any public service company should be regarded as representing an extension to its existing station capacity rather than an outside investment security.

Electrification an Economic Necessity

Heavy Traction Expert Outlines Broad Principles Which Must Be Considered in the Application of the Electric Motor to the Solution of This Country's Transportation Problems

AT A well-attended meeting of the electrical section of the Franklin Institute, held in Philadelphia on Feb. 24, A. H. Armstrong, chairman electrification committee General Electric Company, Schenectady, N. Y., read a paper on the economic aspects of heavy electric traction. W. C. L. Eglin, chairman of the section, presided. Mr. Eglin is electrical engineer of the Philadelphia Electric Company, which supplies the power for the Philadelphia-Paoli-Chestnut Hill electrification of the Pennsylvania Railroad. During the delivery of the address an interesting series of appropriate lantern slides was shown. These depicted recent snow scenes on the Milwaukee electrification, as well as typical heavy electric traction scenes in this country and abroad.

Mr. Armstrong began by pointing out that it is a matter of grave national concern properly to diagnose the true character of the ailment affecting our transportation system and to prescribe the treatment of greatest promise for its future recovery. The congestion on main lines is in many cases acute, and under such conditions the steam locomotive imposes its limitations on the physical and economic showing of a railway property. We want, he said, cheaper and quicker transportation over existing tracks, more reliable service, less congestion at terminals and proper provision for future growth of traffic.

Continuing, he pointed out the apparent impracticability of making such fundamental changes in railway operation and economics as are necessary to accomplish the desired results simply by investing still greater sums in the old steam engine facilities, which have, in the opinion of many, failed to advance with the needs of the times. Furthermore, during the past twenty years serious competition has entered the field of the steam railway transportation in that electric railways have taken over the short-haul passenger traffic and have created new traffic, while the gas motor truck has captured much of the short-haul express movement at the expense of both the steam and the electric railways. When comparatively small trucks bumping over public highways, not too well maintained at the taxpayers' expense, can successfully compete with rail transportation something evidently has occurred during the past few years which calls for a readjustment of previous ideas of transportation. The question then arises, has the railway operator, in his effort to reduce ever-increasing operating costs, been too busily concerned in running his huge transportation machine fully to observe the industrial needs of the country and to appreciate the evident value placed by the shipper upon speed? Our present railways do not properly serve the more congested districts through which they pass, and our railway directors have themselves to blame if they do not profit from a recognition of the facts underlying the growing menace of motor truck competition.

Coming to the place of the electric motor in the solution of the transportation problem, Mr. Armstrong said that electricity has amply proved its effectiveness in the operation of light high-speed trains in congested zones. Steam traditions of a "busy track" have been shattered by electric train performance. Not only is the electric motor pre-eminently fitted to meet the needs of short-haul, frequent-stop service, but it gives opportunity to relocate and redesign the whole terminal railway property along lines impossible with the steam engine. This is illustrated by the development which has taken place in New York City at the Grand Central terminal of the New York Central Railroad, and at the Pennsylvania terminal in the same city. And in addition to the passenger terminal development, the way has been shown to the solution of the equally vital problem of handling freight and express matters in city terminals. The steam terminal is not immediately adjacent to the shipper or center of distribution in a large city, nor is it well adapted to the expeditious or economic handling of freight. The electric terminal, on the contrary, may be located with proper regard to the needs of the shipper in the very center of the city if necessary.

THE ELECTRIC LOCOMOTIVE HAS SEVERAL INTRINSIC VIRTUES

Taking up the electric locomotive, Mr. Armstrong rated it as the most efficient and flexible known means of transforming potential into mechanical power. Based upon the performance of sixty huge electric locomotives operating over nearly 700 miles of route on the Milwaukee Railroad and on other data of record, it has been estimated that the passenger and revenue freight tonnage of the United States could be hauled by electric locomotives for one-third the coal now burned under steam engine boilers. The electric locomotive also offers great advantages for relieving the congestion on mountain-grade divisions, which has reached such a point that additional rails must be laid to obtain the needed relief with continued steam operation. In comparison with the steam locomotive the electric locomotive can not only develop equal pull but can sustain full tractive power at double the speed. It furnishes the opportunity to enter into an era of real unrestricted railroading with the "motive power lid removed." The development of the more powerful electric locomotive is the determining factor in the matter of grade revision, double tracking and mountain division operation.

Another marked advantage of the electric locomotive which was pointed out is its great reliability and consequent low cost of maintenance. For a period of ten years, or until the "high cost of living" struck the electric locomotive, the 120-ton New York Central electric locomotives were maintained for approximately 3½ cents per mile run, a noteworthy achievement when compared with the upkeep of steam engines of equal power. Even during 1919 the Milwaukee locomotives, weighing nearly 300 tons and making some 60,000 miles a year, were maintained for approximately 15 cents per mile, or less than one-third the upkeep of Mallet engines of equal tractive power. Again, cold weather does not affect the electric locomotive, in striking contrast to the frozen steam engines of the winter of 1917-18, while its greater safety and reliability on grades are matters of record. The possibility of regenerating power also should not be forgotten.

Summing up, Mr. Armstrong said that electrified terminals to large cities should revolutionize present steam engine practice and not only effect economies in operation but greatly stimulate traffic by introducing radical improvements in facilities. With no immediate prospect in sight of any material reduction in the price of labor, its output must be increased, and electric operation has demonstrated its effectiveness in this direction. In addition, locomotive division points may be indefinitely extended. All of these improvements in the electrified railway property will cost large sums of money, although in some items of operating expense, such as fuel, crews and maintenance, direct savings are effected of such magnitude as to show a reasonable return upon new capital charges incurred. The argument for electrification, however, is built upon a broader foundation than a direct return upon the investment. It has to do with the vital question of the future growth of our transportation system and its effect upon our national prosperity.

After the reading of the paper Mr. Armstrong was asked several questions, particularly relating to electrification costs and mileages. He said that the original 440-mile electrification on the Milwaukee cost about $13,000,000. This included forty-two regular and two switching locomotives. This figures out at about $28,000 per route-mile or $18,000 to $19,000 per single-track mile. The regular locomotives cost about $130,000 each and they replaced 112 steam locomotives, worth new about the same in total as the electrics; hence the items of locomotives about offset each other. The last 220-mile electrification on this road cost more, having been carried out in wartime, the increase being roughly of the order of 50 per cent.

Mr. Beeler Studies Traffic in Paterson

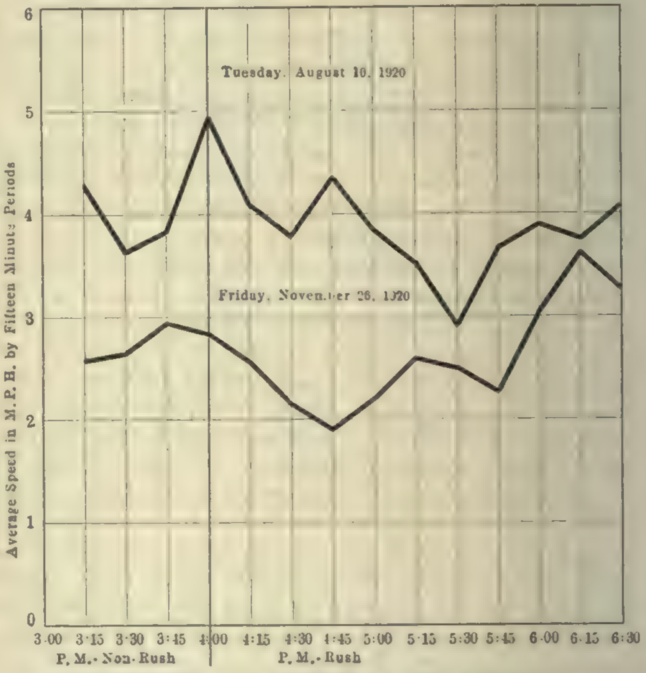
Makes Exhaustive Report on Existing Conditions Together with Suggestions for Relieving Vehicular Congestion that Is Stagnating Paterson's Main Thoroughfare—Localized Traffic Centers for Dual Transportation Systems and Through Routing of Trolleys Among the Recommendations

IN A TWO volume report, with maps and tables, John A. Beeler, consulting engineer, New York, analyzes existing traffic and congestion in Paterson's business district and make suggestions for rerouting trolley cars and jitneys that now get in each other's way, with the result that during the evening rush hour all vehicular traffic in the center of the city moves at a rate of less than 3 m.p.h.

Paterson, the third largest city in the State of New Jersey, has a business district of but three main streets to serve a quarter of a million people. All trolley routes focus on the section of Main Street between Market and Broadway, from which most of the cars return to their point of origin via loops, while a few only are through routed. The safety cars that have been installed recently on all the local lines on shorter headway have caused a consequent increase in the number of cars in the central section. In addition, many jitney buses enter the heart of the congested district to deliver passengers and on their outbound trips practically all go through Main Street.

The accompanying diagram indicates car speeds in this central section. The average speed for a three and one-half hour period was but 2.7 m.p.h., while for a single fifteen-minute period it dropped as low as 1.9 m.p.h. This is obviously slower than walking. An abstract of Mr. Beeler's findings follows:

In the business district the designated passenger car stops average fifteen to the mile, whereas eight stops per mile is good practice. The stops in the central districts should be so relocated as to be convenient and safe, yet reduce to a minimum the interference with other vehicular traffic. Thus the number of stops can be brought down from fifty to thirty-seven. Double berthing of cars is recommended at the fourteen busiest stops, raised loading platforms to accommodate two cars each at three points and safety zones marked with stanchions at certain stops.



INDICATED CAR SPEEDS IN THE CENTRAL AREA OF PATERSON

Repeated observation has revealed that the standard jitney practice attempts to give the same headway as the car line, with the buses leaving a minute or two in advance of the cars. This practice fails to give any real additional transportation service, for it simply provides extra seats that are not needed, as the cars are very seldom filled to capacity even in the rush hours. The only benefit that could accrue to the city from jitney operation would be to have them routed where there is no car service. If the jitneys are unwilling to submit to such a change in routing, it is questionable whether they are of sufficient benefit to the city to justify their retention.

All jitney lines now loop in the business district of the city, with the result that they are turning at the most congested points and are not only delaying vehicle traffic but wasting much of their own time. If jitney operation is to be continued, a terminal loop should be used near the center of the city but away from the car lines.

Jitney loading is found to cause some delay and congestion, largely because they almost invariably stop so far from the curb that other vehicular traffic must also stop. Loading should be at definite and plainly marked points where other vehicular parking should be prohibited. The jitneys should be required to pull in to the curb. The present plan of diverting through truck traffic from the center of the city can be extended by keeping all heavy trucking away from the Main Street congested district, except for the necessary purpose of loading or unloading to abutters.

The left-hand turn causes the most delay and confusion at street intersections. Observations at Main and Market Streets from 5 p.m. to 6 p.m. showed 100 left-hand turns out of a total of 410 vehicles at that corner, in addition to 144 street cars. At its widest point, Main Street is barely wide enough to allow a row of parked vehicles, a row of moving vehicles and a row of moving street cars in each direction. At the more important intersections the roadway is even narrower. As a means of lessening congestion indiscriminate parking of motor and horse-drawn vehicles can be limited or prohibited at car and jitney stopping points.

STREET CARS SHOULD HAVE RIGHT OF WAY

It has been demonstrated that the maximum amount of traffic can be moved through an intersection when the street cars are given the right of way. In Paterson, the proposed car stops have been arranged so that many cars are ready to move immediately on the traffic officer's signal. Positive stops required only for safety purposes should not cause delay, as loading is not to be permitted at such points.

The adoption of these recommendations, the report claims, will be followed by an improvement in traffic conditions, for congestion will be reduced even though parking privileges have been retained and a dual transportation system of street cars and jitneys is operated within the confines of such a limited business district.

Unquestionably the modern street car is the most reliable, safest and economical urban transportation unit, provided the volume of business warrants the construction of track and plant. Were it not for the fact that the street railway provides service, whether remunerative or not, to all points at any time of day and cares well for rush-hour traffic, the unregulated jitney would never be tolerated.

STREET CARS AND CONGESTION

The loop routing of the street cars at each end of the important business section, which is only a short city block of 300 ft., is one of the principal causes of congestion. All but two of the car lines, which are through routed, make one of these loops. In general some advantages of the loop system are:

1. That each section of the city is served independently, thus confining delays to that section.
2. Makes for shorter routes.
3. Allows better adjustment of service to fit traffic conditions.

In Paterson there are also some disadvantages, which are classed as:

1. Cars must be sent across the congested district merely for the purpose of taking the loop, thereby causing congestion and resulting in slow operation in the densest traffic.
2. Causes more transferring of passengers, as all crosstown passengers must change cars in the center of the city.
3. Causes duplication of cars and service and creates congestion due to loop cars being used entirely for unloading or loading, while in the business district, whereas compared with through routed service, loading and unloading is done simultaneously when cars pass through the business district.
4. No layover is possible on a common loop used by several routes to keep the cars on proper headway.

The disadvantages outlined for the loop system are almost impossible to overcome, but the advantages can be incorporated in a system of through routing. In Paterson a material gain can be made in reducing congestion by through routing all possible lines.

CHANGES IN ROUTING

Interurban lines should be routed to give the maximum benefit to the communities connected. Such routes cannot be entirely successful if compelled to handle much urban business or traverse the tracks of local urban routes. Experience shows that interurban cars have a tendency to block the locals and delay them.

In Paterson, several lines enter the heart of the city from various outside communities. On none of these is there any distinction made between local and through passengers. In order to provide better service, the interurban cars should be run on express schedule, stopping for passengers only at designated points. These points should be at the principal loading corners and all transfer points, but they should average not less than 1,200 ft. apart.

Observations show that on practically all of the local lines a large number of passengers ride only a short distance from the center of the city. Short line service is recommended to give better service on four routes. A maximum of service to all patrons will result, as more even service can be given to the outer ends of the lines.

IMPROVEMENTS IN OPERATING METHODS

Another factor that contributes in no small measure to the low schedule speed is the slow fare collection, which is caused by excessive change making for a large number of passengers compared with the old nickel rate, when about 90 per cent of the passengers had the exact fare. Some of the advantages of even fares can be obtained by the use of tickets or metal tokens sold in quantity or used by the conductor in making change.

The report also suggests that each car should be conspicuously marked with both route and destination signs and that all stopping places in the congested area should be plainly marked by car stop signs hung from the span wire at the exact point where the front end of each car will stop. Signs with the words "Car Stop"— or at double berth stops "Car 1" and "Car 2"— should appear at the more important loading points and particularly at railroad station stops. Information should also be posted at abandoned stops on Main Street directing prospective passengers to the new locations.

A telephone dispatching system with connections at the end of each car line, and other important points controlled by central dispatchers to whom trainmen report before leaving starting points, will do much to keep the cars on proper headway and render the service more flexible. This method is superior to starters at terminals, as it keeps all cars in touch with a central authority and makes it possible to minimize irregularity.

The report also recommends that two additional lines be equipped with safety cars. This would make for a complete installation of cars of uniform design and appearance with the exception of the larger cars on the interurban lines.

Association News

Steps Taken Toward Cable Standardization

THE representatives of bodies interested in considering the advisability of undertaking the development of standards for wires and cables, other than for telephone and telegraph use, met on Feb. 2, 1921, at the Engineering Societies Building. The meeting was called by the American Engineering Standards Committee at the instance of the American Railway Engineering Association. Practically all the interests invited were represented by one or more individuals. Charles R. Harte, construction engineer the Connecticut Company, was the delegate for the American Electric Railway Engineering Association. It was unanimously voted that A. A. Stevenson, chairman of the American Engineering Standards Committee, who called the meeting to order, be requested to retain the chair. A preliminary note regarding the meeting was printed in the issue of Feb. 26. More details are given below.

The first question of whether unification should be undertaken was fully discussed by nearly all of the representatives present. It was agreed that the specifications and standards of the various organizations working in the field had generally been along similar lines and that it was desirable that they be unified so that uniform national standards might result. This work should be undertaken with a single general plan covering substantially all the more important uses. It appeared to be the unanimous opinion that the scope of the work should be limited in such a way that it would be a unification of specifications and standards already in existence rather than an attempt to formulate entirely new standards, except in fields not already covered. After a rather full discussion of the details of the subjects which should be covered it was decided that these should comprise the quality and stranding of the conductors, the various kinds of insulation and coverings and the sheath and armor.

It was the consensus of opinion that in order to promote export trade it would be desirable to have all the American wire and cable standards assembled in a single book. This form of publication, while giving due credit to the participating organizations, would appear to foreign wire and cable purchasers as a complete book of American standards rather than as the standard of societies comparatively unknown abroad. This has been done in a very thorough way by the Germans and also to a considerable extent by the British, thus placing Americans at a decided disadvantage in foreign trade. It was agreed that if such a book were prepared and given proper publicity in foreign countries it would remove one of the greatest difficulties under which American manufacturers now labor in developing export trade.

During the discussion of the various matters before the conference frequent reference was made to memorandum presented by the representatives of the American Institute of Electrical Engineers, summarizing reasons for undertaking the work, outlining what they consider a desirable scope for it, and sketching an outline for a committee organization for carrying it out. It stated that by far the largest single item o expense in electrical engineering projects is the cost o wires and cables. Also the element involving the greatest risk of life and property and of continuity of industrial power is in the wire and cable system. If standardization can reduce costs and decrease risks, it i obvious that this field presents unusual opportunities Much work of an excellent character along the line o standardization of wires and cables has already bee done, mostly, however, by organizations working in behalf of special industries. While a spirit of co-operatio has prevailed, special requirements of those industrie have created certain divergent tendencies which ar probably susceptible of being reconciled by properl organized co-operation.

Two-Cent Coin Bill Dies

AT A meeting Feb. 26, 1921, in the Washington office of the association it developed that there wa practically no chance of the 2-cent coin bill goin through, it being too far down on the calendar to b called up. No further steps will be taken, as the bil dies automatically March 4.

Buildings and Structures Subcommittee Meets

A MEETING of the buildings and structures subcommittee No. 2, which is to report on the design o a typical shop building and shop layout, was held a association headquarters in New York City on Feb. 17 Those present were N. E. Drexler, Newport News Hampton Railway, Gas & Electric Company, chairman D. E. Crouse, Rochester & Syracuse Railroad, and C. W Squier, ELECTRIC RAILWAY JOURNAL, the last-named representing the committee on equipment, which is co-operating with the buildings and structures committee o shop design.

After a general discussion of the subject was ha the details were divided among the two committees an several subjects on which it is necessary to have information were outlined so that this could be obtaine as soon as possible. The two committees will hold joint session again some time in March.

Association Aiding I. C. C. in Determinatio of Depreciation Allowances

ON FEB. 5, 1921, the committee on a standar classification of accounts held a meeting at association headquarters, in accordance with action take by the executive committee of the American Associatio to consider the subject of depreciation as prescribed i the transportation act of 1920. Those present wer H. L. Wilson, Boston Elevated Railway, chairman Robert N. Wallis, Fitchburgh & Leominster Street Rai way, and P. S. Young, Public Service Railway, Newark, N. J.

The transportation act of 1920 amends section 20 o the act to regulate commerce by providing that th Interstate Commerce Commission is to prescribe th classes of property for which depreciation charges ma properly be included under operating expenses and th percentages of depreciation which shall be charged wit respect to each of such classes of property. The carrier subject to this act are not allowed to charge to operatin expenses any depreciation charges on classes of propert or a percentage other than those prescribed by the commission.

The depreciation section of the Interstate Commerce Commission asked the co-operation of the American Association in the determination of these depreciation allowances and at the Chicago meeting of the executive committee the matter was referred to the committee on a standard classification of accounts. The committee discussed the subject generally and decided that it was necessary to have a conference with F. S. Fowler, chief of the depreciation section of the Interstate Commerce Commission, before it could proceed further with the work.

Engineering Executive Committee Meets

A FORMAL meeting of the executive committee of the Engineering Association was held at association headquarters on March 1, 1921, to consider special matters that had come up since the last convention.

Among those present were: President W. G. Gove, Brooklyn Rapid Transit Company; C. H. Clark, the Cleveland Railway; H. A. Johnson, Metropolitan West Side Elevated Railway; C. S. Kimball, Washington Railway & Electric Company; A. B. Stitzer, Republic Engineers, New York; J. W. Welsh, special engineer of the association, and E. B. Burritt, secretary.

Among the matters discussed was that of the resignation of First Vice-President C. L. Cadle, who is now superintendent of public works, State of New York. Under the terms of the constitution and by-laws it is within the power of the executive committee to fill this vacancy. The consensus of opinion, however, was not to fill the vacancy at this time and therefore any action was unnecessary.

J. W. Welsh reported on the work of the several standing committees. His report indicated that matters were well in hand and that the work for the ensuing year was progressing satisfactorily.

The standing committees had requested executive action be taken on several subjects. The committee on power distribution had asked for approval of the American Institute of Electrical Engineers being appointed sponsor for the specifications of aluminium wire, which was granted.

The request of the committee on way matters for permission to co-operate with the American Society for Municipal Improvements in the discussion of pavements and tracks in general was granted.

A plan was developed whereby the existing standards of the association may be brought promptly before the American Engineering Standards Committee for their approval. Under this plan each chairman of a standing committee will select such of his own existing standards as he desires to submit. Each standard in the list, accompanied by a history drawn in accordance with the rules of the committee, will be submitted to the Standards Committee of the association at its next meeting. After the selection has the approval of the last-named committee the matter will be turned over to the association's representative on the American Engineering Standards Committee for presentation to that body and approval.

The executive committee voted power to the president to appoint, with the secretary of the American Association, representatives with power to act on matters before the American Engineering Standards Committee. On this basis the appointment of Martin Schreiber as the official representative of the association, A. B. Stitzer as the association's representative on the subcommittee on terminal markings, C. R. Harte and F. J. White as the association's representatives on the subcommittee on wires and cables and C. W. Squier as the representative on the subcommittee on standardization of pipe flanges and fittings were approved.

It is planned to hold the next meeting some time in the early part of June.

Cost of Freight Traffic to Be Studied

THE joint T. & T. and Accountants' committee on express and freight traffic promotion and costs met at association headquarters on March 2 to plan an investigation as to what freight traffic on electric railways actually costs.

Those present were F. W. Coen, Lake Shore Electric Railway Company, chairman; A. R. Baxter, Indianapolis & Cincinnati Traction Company; T. C. Cherry, Rochester & Syracuse Railroad Company; J. H. Crall, Terre Haute, Indianapolis & Eastern Traction Company; L. T. Hixon, Terre Haute, Indianapolis & Eastern Traction Company; L. E. Lippitt, Auburn & Syracuse Electric Railroad Company; C. K. Savery, Connecticut Company; T. H. Stoffel, Westinghouse Electric & Manufacturing Company; C. E. Thompson, Chicago, North Shore & Milwaukee Railroad; A. F. Van Diense, Columbus, Delaware & Marion Electric Company, and W. K. Zinmeister, Rochester & Syracuse Railroad Company.

The committee considered the classification of accounts prepared by Mr. Zinmeister, made certain corrections and extensions and finally approved a form of classification which will be forwarded to a selected list of companies doing freight or express business. They will be requested to keep their freight and express accounts in accordance with this classification for a period of three months beginning March 1. The purpose of this phase of the committee's work is to secure actual figures as to what the cost of this service would be.

The chairman will assign to various members of the committee the duty of taking up the question of the adoption of this classification personally with executives of companies in their territory.

February Bulletins Now Available

SIX special reports and compilations were prepared by the Bureau of Information and Service of the American Association during February. One is a comparative financial statement of a large group of electric railway companies for 1920 compared with 1919. A second is a summary of replies on the free transportation furnished to employees and others. The third is a supplement to the previous compilation on one-man cars, giving information from six additional companies.

The titles of the other reports follow: "Analysis of Labor Agreements of Interurban Companies," "Effect of Establishment of 10-Cent Cash Fare," "Percentage of Ticket Passengers and of Free Transfers for a Number of Companies Having Various Cash and Reduced Ticket Rates of Fare."

In addition, up-to-date supplements have been prepared to the bulletins on wages of trainmen, cost of living and fares.

Meeting of Way Committee Well Attended

A MEETING of the committee on way matters was held at the association headquarters in New York City Feb. 23. The entire personnel of the committee, with one exception, was in attendance, and this one was excused from attending due to his long distance from New York. Those present were R. C. Cram, Brooklyn Rapid Transit Company, chairman; H. A. Abell, New York State Railways; C. A. Alden, Bethlehem Steel Company; Victor Angerer, William Wharton, Jr., & Company; W. R. Dunham, Jr., the Connecticut Company; E. B. Entwistle, Lorain Steel Company; H. F. Flowers, Differential Car Company; H. H. George, Public Service Railway; W. F. Graves, Montreal Tramways; E. M. P. Ryder, Third Avenue Railway, and T. B. Skelton, Metal & Thermit Corporation. Others present who were invited to furnish information and co-operate with the committee were H. A. Benedict, Public Service Railway; J. C. Jameson, Dayton Mechanical Tie Company; H. F. A. Kleinschmidt, Lorain Steel Company; C. W. Squier, ELECTRIC RAILWAY JOURNAL, and R. W. Steigerwalt, Carnegie Steel Company.

A general discussion of the eight subjects on which this year's way committee is to report took place and the further procedure necessary for following the program was outlined. The discussion on results obtained from arc-weld joints showed that these vary to quite an extent, and it was the general opinion that the skill of the operator had a very important effect on the results obtained.

In connection with the subject of substitute ties for use in paved streets J. C. Jameson was invited to outline the advances and results obtained from installations using the Dayton mechanical ties. Other manufacturers have been asked to present similar information regarding their products at subsequent meetings of the way committee. The committee decided that other manufacturers of substitute ties are to be asked to supply the committee with a list of users and that the subcommittee on this subject is to prepare and send out a questionnaire to these users for obtaining additional information.

In the discussion of the possible advantages of curved contours for treads of new wheels H. A. Benedict represented the committee on equipment and presented blueprints of a large number of contours taken from worn wheels, which had been prepared by R. H. Dalgleish, chief engineer Capital Traction Company, Washington, D. C. H. F. Flowers, chairman of the way subcommittee on this subject, presented some blueprints arranged to show the theoretical advantages of a curved contour as they appealed to him. After an animated discussion of the subject, the committee decided that discussion and theorizing would produce no beneficial results, but the most advantageous course would be to have tests made in actual operation and thus determine results from practical consideration. The committee decided to leave the making of further tests and their following up to the committee on equipment.

The subcommittee on specifications for special trackwork reported progress and expects to have a report ready for discussion at the next meeting.

Under the subject of standardization of frogs and track center distances it was decided to recommend for adoption as "Recommended Practice" the eight distances as proposed in the 1920 way committee report, these to be recommended for use in special trackwork layouts for all track gages. The subcommittee submitted tables and data in connection with the standardization of branch-off frogs and was requested to prepare same in suitable form for publication as a progress report. Similar tables and plans covering a proposed standard method of design for car clearance curves, using association spirals, were submitted and referred back for further study along suggested lines.

Considerable progress was made in the study of a proposed revision of the recommended design of layouts for switches and mates. Certain of the switches are to be proposed for raising to standard and certain others are to be dropped, if the report of the committee is accepted by the association. Some of the switches are not now used and others have but little use, according to data which the subcommittee has secured.

The subject of standardizing frog angles in crossovers and turnouts was brought up and referred to the subcommittee, with the view of reconciling the slight differences now found in the designs of the several manufacturers. There appears to be no good reason why the same frog angles should not be used by al companies.

In connection with the subject of wood preservation the subcommittee was ordered to complete its proposed questionnaire for issuance as soon as possible. The subcommittee has made great progress in assembly o specifications for preservative oils, analysis and treatment methods. It is hoped to arrange for co-operation with several other national societies which have the same subject in hand.

The committee expects to meet again on April 6.

Camden Company Section Meets

THE monthly meeting of the Camden company section, No. 13, was held on Feb. 17. The speaker o the evening was William A. Searle, secretary-manager of the Chamber of Commerce of Camden, who in a interesting and instructive discourse spoke of the Chamber of Commerce as an institution that takes an interes in everybody's business without selfish motives, bu with the main object of serving the city in all capacities The speaker then considered the transportation situation from the point of view of a person outside of th railway organization, looking in, instead of on the inside, looking out. He showed how the motormen an conductors can by their courtesy to the patrons of th road and by their personal appearance restore the confidence of the public in the railways.

The slogan that Mr. Searle suggested was "A Voic with a Smile." Another suggestion worthy of seriou consideration was that of having a "Good Mornin Week." He brought out that a way to seek a persona touch with the patrons of the lines is to have a card i the car to inform the public whether it was "Dick Jones' or "Fatty" Arbuckle's car on which they obtaine efficient service and received courteous treatment. I driving home his point he did not offend the rank an file of the men; on the other hand they liked his line o argument and were not afraid to come back in the sam spirit.

Martin Schreiber, manager Southern Division Publi Service Railway, in closing the meeting, stated how important it is to hear both sides of the transportatio question and called attention to the fact that for thre days 400,000 passengers had been carried in the Southern Division daily without a single delay.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Mayor Denounces Council

Chief Executive of Seattle Objects to Declaration that the Municipal Railway Is Making Money

The City Council of Seattle, Wash., has adopted a resolution, with only one dissenting vote, declaring that the receipts of the Municipal Railway under he present 8⅓-cent fare are adequate to pay all wages, maintenance and interest charges, and leave more than $1,000,000 a year to meet the first redemption payment on the $15,000,000 of bonds issued in payment for the railway system. The resolution added hat it was not the intention of the Council to resort to taxation to support the railways, unless it was expressly directed to do so by vote of the people. The measure declared that figures based on thirty-four days' receipts up to Feb. 10 showed the lines would make $1,060,000 a year above interest charges.

Mayor Hugh M. Caldwell, in discussing the resolution, denounced the City Council for its action in passing such an ordinance. Mayor Caldwell said:

> The action of the Council in passing the resolution is directly opposite to the recommendations of the grand jury. Instead of aking or authorizing some action to obtain relief from the present contract this is designed more securely to fasten it upon us. The resolution will doubtless make its appearance in the litigation now pending. The people may find some solace in the fact that the resolution of the Council at least agrees with the grand jury report in so far as it finds that the street railways are being properly managed.
>
> The resolution ignores the report of the city comptroller showing that the city expended from the general tax revenues in 1919 on account of the municipal railway properties $105,725, and for 1920, $117,803, and that estimated on the budget for 1921 the city intends to expend from the same source for the same purpose an additional $182,777, or for the two years and a fraction, from the general tax revenues for the nine months of 1919, for 1920 and 1921, $406,305, unless perchance the $182,000 expenditure for 1921 is restrained by the court.
>
> I have not been able to find in the resolution even an optimistic forecast of when the $83,000 heretofore borrowed from the general fund may find its way back to that fund.

COUNCIL'S FIRST COMMENT

The resolution was the first expression by the Council on the railway situation since the grand jury and Mayor Hugh M. Caldwell reported some weeks ago on their investigations of the city's purchase of the lines. The ordinance was referred to the utilities and finance committees without debate. The text follows:

> Whereas, the financial condition of the Municipal Street Railway system is being misrepresented to the discredit of said system and of the city; and,
>
> Whereas, in fact the receipts of said Municipal Street Railway system during thirty-four days, up to and including Feb. 10, 1921, and including the last day's operation under the 6½-cent fare, aggregated the sum of $624,525, a daily average of $18,368.30, or an indicated annual receipt of $6,704,642; and,
>
> Whereas, the average of the expenditures for November and December, 1920, January, 1921, and estimated expenditure for February, 1921, will approximate $470,000 a month, which said sum includes a monthly allocation of interest on all utility and general bonds issued in connection with the municipal street railway system, or a prospective annual expenditure of $5,640,000, including all of such interest, indicating that during one year's operation on the present rate of fares, with similar receipts and expenditures, there will be a balance remaining for application toward the payment of principal on outstanding bonds approximating $1,060,000, or that on March 1, 1922, there will be an approximate balance of $1,220,000 for such purposes; and,
>
> Whereas, the expenses of said Municipal Street Railway system are decreasing; and,
>
> Whereas, the experience of the Municipal Street Railway has shown that January and February are two of the poorest months of the year from a revenue standpoint; and,
>
> Whereas, it is apparent from the foregoing that the revenues to be derived from the Municipal Street Railway system will be more than sufficient to meet all amounts properly chargeable thereto. Now, therefore,
>
> Be it resolved, by the City Council of the city of Seattle, that the city railway fund is a solvent fund, and will be more than able to meet all lawful charges against the same.
>
> Be it further resolved, that it is not the intention of the City Council of the city of Seattle to resort to taxation or to any fund dependent thereon for the purpose of maintaining or operating said Municipal Street Railway system nor to pay any utility bonds, or interest thereon, by taxation or from any fund dependent thereon, unless expressly directed so to do by vote of the qualified electors of the city.

MUNICIPAL RAILWAY UP AGAINST STONE WALL, SAYS SEATTLE "TIMES"

Another Wage Cut Proposed

Officials of the Manchester (N. H.) Street Railway have proposed a general 20 per cent reduction in the wages of all employees to become effective on April 1.

Approximately 300 employees will be affected. The present rates for trainmen are 60 cents an hour after one year of service. Officials of the company do not anticipate any immediate reduction in the fare, which is 8 cents.

This rate, the officials claim, is now larger than in most New England cities.

$4,000,000 Electrification Plan

Municipal Delegates Consider Change in Power on 80 Miles of Grand Trunk Railway

Delegates from all of the municipalities served by the London, Huron & Bruce branch of the Grand Trunk Railway, operating between London and Wingham, Ont., convened at London on Feb. 23 to consider a proposal to electrify the line as a hydro radial similar to the present London & Port Stanley Railway.

DOMINION GOVERNMENT TO BE APPROACHED

They unanimously adopted a resolution requesting the Hydro Electric Power Commission of Ontario to "approach the Dominion Government with a view to acquiring, leasing or securing running rights over" the road "on behalf of the municipalities through which it operates"; and also requesting the power commission to supply the municipalities interested "with a report showing the estimated cost of the line, electrified, and equipped for satisfactory service, together with estimates of the probable future earnings, operating costs, etc., as provided for by the hydro radial act."

It will now be necessary for the individual municipalities to adopt the same resolution before action can be taken by the commission.

The proposal for electrification was first advanced by Vice-Chairman Philip Pocock of the city of London Commission in charge of operation of the London & Port Stanley Railway. The meeting which followed was held under the auspices of the London City Council and Chamber of Commerce. All of the delegates defined their attitude as favorable to the scheme if its feasibility from a financial standpoint is proved by the reports of engineers that are now to be secured.

OPPOSITION TO SCHEME ALLEGED

Louis A. Wood, professor of economics of the faculty of Western University, London, Ont., basing his computations on the percentage increases in costs of the principal materials required, and the fact that electrification of the London & Port Stanley Railway cost $20,000 a mile six years ago, declared that the cost of the London, Huron & Bruce enterprise would be $50,000 a mile, or a total of $4,000,000 for the 80 miles between London and Wingham. His calculations were disputed. The allegation was made that anti-public ownership interests are already further distributing literature among rural councils and farmers' clubs in an effort to kill the scheme.

The movement is regarded in Ontario as having political aspects of a most important character in view of the fact that Premier Drury, as chief of the United Farmers' government now in power in that province, has held up all hydro-radial plans of the Hydro Electric Power Commission pending receipt of the findings of a government royal commission that has been given widest powers to conduct an impartial investigation.

RURAL DISTRICTS FAVOR PLAN

All rural delegates at the London convention declared that their municipalities would vote the necessary funds if the report proved favorable. The rural districts are also keenly anxious to participate in the benefits of distribution of electricity generated at Niagara Falls, and the hope is held out that the extra load consumed by the railroad would cut farm power costs $5 to $20 a horsepower a year.

Several United Farmers' Clubs, which are the source of Premier Drury's power, have assumed the attitude that the project in all its ramifications must be proved to them to be highly desirable before they will approve it, while a few others are as yet undecided in the matter.

The road would have to be acquired from the Dominion Government because of the fact that the whole Grand Trunk system is now being taken over for incorporation in the Canadian National Railways.

Disastrous Fires in Boston and Levis

Fire losses of $630,000 were sustained recently by the Boston (Mass.) Elevated Railway and the Levis County Railway, Levis, Que., in conflagrations which destroyed carhouses of these companies. The Boston fire caused a loss of $400,000 to the Boston "L" and the Levis County fire caused a loss of $230,000 to the Levis County Railway.

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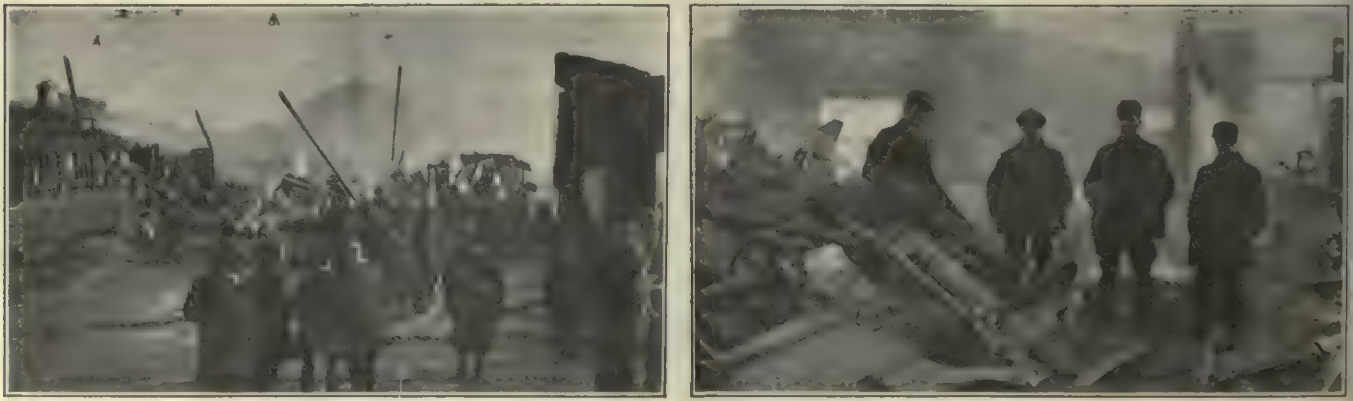
THE TWISTED WRECKAGE OF THE BOSTON CARS

Details of the rolling stock destroyed in the fires were published in the ELECTRIC RAILWAY JOURNAL for Feb. 26, pages 415 and 429. The fires were particularly disastrous, the damage which they did completely destroying the plants as is indicated in the accompanying illustrations.

The equipment destroyed in the fire at Levis included fifteen cars, four sweepers and two plows, representing the entire rolling stock of the company with the exception of six cars. The equipment which was destroyed at Boston included twenty-three articulated cars, eight semi-convertible cars, four trailers and four miscellaneous cars on plows.



TWO PICTURES SHOWING DEVASTATION BY FIRE AT LEVIS

Mayor Couzens Pleased

Detroit's Chief Executive Well Satisfied with Municipal Railway Progress —First Lines Now Open

In Mayor Couzens' recent message to the City Council of Detroit, Mich., interesting data were presented relative to the activities of the city of Detroit in constructing the municipal railway. The policy of the administration on railway matters for 1921, according to the Mayor, will be that announced in 1920 and approved April 5, 1920, by 63 per cent of the voters.

RAILWAY'S IMPROVEMENT SHOULD NOT BE HINDERED

The fact is recalled that during the past two years $65,000,000 has been appropriated for public improvements, including $15,000,000 for the municipal railway. It is stated that while the present problem is to reduce general expenditures to a minimum by business-like judgment the progress of programs already under way should not be hindered.

On Dec. 30 last the Street Railway Commission had presented by its manager figures showing that the railway plan under which they have been working is financially correct as to construction estimates made to the people at the election April 5, 1920. The 18⅜ miles of track built during the past nine months have cost, including the overhead, between $95,000 and $97,000 a mile. The commission is now in a position, however, whereby it may build the best type of railway construction for $62,649 per mile.

PROGRESS EXPECTED BY END OF YEAR

Considerable trackage to be built during the coming spring and summer in unpaved streets may be built for as low as $35,000 a mile. This will bring the average cost of the construction of the 100.75 miles of track proposed in the A and B groups in the ordinance approved last April to a price considerably below the $70,000 figure estimated last April when the plan was proposed.

The Mayor stated that the construction progress to date shows that the remaining 62 miles of track in the A and B groups can be built by Dec. 1 of this year.

The first section of the Municipal Railway is now in operation.

He has threatened to call a referendum on it. He said opposition had been growing because the plan released the company from paving between tracks.

Mayor T. M. Mitchell signed the ordinance and sent it to the company on Feb. 17. It has since been accepted by the company.

Lower Wages and Fares Planned

Trustees of Eastern Massachusetts Street Railway, Operating 730 Miles, Plan to Rewrite Union Contract

The trustees of the Eastern Massachusetts Street Railway, Boston, Mass., ave notified their employees who are members of the Amalgamated Associa-ion that they do not intend to renew the existing contract as to wages and vorking conditions. This contract expires on May 1. The trustees sent a ormal letter to the secretary of the joint conference board of the Amalgamated, opies being furnished to all the local papers.

THE trustees call attention to the fact that the present wage scale was established as a result of ar-itration last September, giving the en a 20 per cent increase based upon e then estimated increase in the cost f living. The trustees now contend at this cost of living has decreased ore than this percentage, that wages many industries have been decreased accordance with living costs and that e public has a right to expect the ages of the railway employees to be no ception.

The reduction in wages is justified, the opinion of the trustees, by the ct that the United States Labor ureau of Statistics and other authori-es figure that the cost of living has eclined more than 20 per cent since ay 1, 1920.

BACK TO OLD WAGE

This reduction will make the basic age what it was prior to the award the arbitration board of Sept. 11 st, which award was retroactive to ay 1. An outline of this award was ven in the ELECTRIC RAILWAY JOUR-AL.

The present scale paid is 56 cents an ur for the first three months' service, cents an hour for the next nine onths, and 62 cents an hour there-ter. Prior to the adoption of this ale the rates were respectively 46, and 51 cents an hour. The last in-ease was approximately 20 per cent, d with the bonus of 5 cents an hour one-man cars increased wages ,400,000 a year.

This is the first step in New Eng-nd toward a reduction in electric ilway wages, and it is said that a turn to the 5-cent fare is the ultimate ject of the trustees. The trustees so plan to reduce fares in many places nultaneously with the reduction in ages.

NION PLANS COUNTER PROPOSITION

The presidents of the carmen's unions ve declared that the men will not llingly submit to the cut in wages. e union plans to take up the matter special meetings and offer a counter oposition and endeavor to secure its ceptance by the company. Un-ubtedly the controversy will be car-d to an arbitration board if an icable settlement cannot otherwise be cured.

In their letter the trustees said:

> The existing agreement between this mpany and the Amalgamated Association d the several divisions thereof runs up to d including May 1, 1921. The public stees hereby notify you that the company does not desire to renew said agreement and that effective May 2, 1921, it cancels and terminates each and every section of said agreement.
>
> The public trustees have taken this action because experience has proved that many conditions of the existing agreement have been detrimental to the best interests of the car riders and make it extremely difficult to operate this street railway efficiently and for the benefit of the public.
>
> The company will take up with your association at any time the subject of a new agreement much simpler in form than the present agreement.
>
> Last September an arbitration award increased wages of employees of this company 20 per cent, effective from May 1, 1920, to May 1, 1921. This increase was based upon increased cost of living up to May 1, 1920.
>
> According to the United States Labor Bureau of Statistics and other authorities the cost of living has declined more than 20 per cent since May 1, 1920.
>
> Wages in practically every industry have been and are being reduced in accordance with the decrease in the cost of living and the public naturally has the right to expect that wages of street railway employees shall be no exception.
>
> If street railway wages remain at high war levels while the wages of every one else are being reduced substantially lower car fares will be impossible.
>
> Therefore, we advise you that on and after May 2, 1921, the basic rates of wages that prevailed prior to the last increase, which became effective May 1, 1920, will be restored; the differential for one-man car operators will remain at 5 cents.
>
> Fares will be reduced in every district on the Bay State System on the day when this change in wages takes effect.

The contemplated reductions will affect not only the men employed in the car service but also the men in other capacities, such as power house men, linemen, laborers and other classes whose pay now ranges from 62 to 92 cents an hour. They would also be returned to the same basis as before the Ogburn arbitration board's award. Though all these classes are not treated as members of the union their wages are maintained in proportion thereto.

Service-at-Cost Grant Passed in Findlay

By a vote of six to one a service-at-cost railway franchise has been granted to the Toledo, Bowling Green & Southern Traction Company by the City Council of Findlay. Under the terms of the new agreement the initial fare on the lines in Findlay is to be 8 cents, an increase of 3 cents over the present fare. A stabilizing fund of $20,000 is set up to regulate fares.

A commission of three members will control service on behalf of the city. The commissioner is to be the service director of the city.

The company will receive an annual return of 7 per cent upon the property valuation. The company has ten days in which to accept or reject the new ordinance.

Councilman J. W. McCormick dissented on the passage of the ordinance.

Senator Has His Inning

Mr. Johnson Appears Before Committee at Albany in Opposition to Utility Bills

Supporters of the public utility legislation fostered by Governor Miller of New York outnumbered by far the opponents of the relief measures at the public hearing at Albany on March 2. Mayor John F. Hylan, Comptroller Charles L. Craig and President F. H. La Guardia of the New York Board of Aldermen were on hand to oppose the Governor's bill. United States Senator Hiram W. Johnson of California, retained by the Hylan Administration to fight the Governor's transit program, easily was the star orator of the opposition. Spokesmen for several up-State cities appeared, a majority going on record as opposing the bill.

Former City Comptroller William A. Prendergast bore the brunt of Senator Johnson's attack. In answer to the charge that Governor Miller's bill endangered the principles of home rule, Mr. Prendergast showed that on one occasion Mayor Hylan himself had appeared in opposition to a bill to end "Death Avenue" in New York and caused the power to settle the matter to be taken from the Board of Estimate.

Aligned with Mr. Prendergast were former Comptroller Herman A. Metz, former State Tax Commissioner Martin G. Saxe, Joseph Levenson and Mrs. Francis H. Kelly, all from New York.

There were fewer than a dozen speakers for the opposition. Its principal spokesmen, besides Senator Johnson, were Comptroller Craig, Aldermanic President La Guardia, Corporation Counsel John P. O'Brien of New York, and Mayor George R. Lunn of Schenectady.

Senator Johnson declared that the Governor's bill violated both the State and the Federal Constitution in that it proposed to confiscate the 5-cent fare, which was "a property right of which the people of the city cannot be deprived, except with the consent of the city."

Senator Johnson said that the remedy of the city's transit evils was to give it a fuller measure of home rule, a broader grant of power to manage its own affairs, including the transit situation.

On this point he said:

> This bill makes a mockery of home rule and of self-determination. Who has the ultimate right under our institutions to govern? You may say that the city of New York may govern itself ill. That is no answer. Under our system—in our democracy—every community has the right to govern itself as it sees fit—govern itself well, we pray, but govern itself ill if it desires.

Mayor Hylan filed a brief setting forth his views. Comptroller Craig declared that the city of New York had rights which antedated and rights the State had bestowed upon it, and which for this reason could not be taken away by the State. Among them, he said, was the right to say on what terms its public utilities should be operated. President La Guardia of the Board of Aldermen denounced the bill as a measure "the dominent note and minor motive" of which was an increase in fares.

Prior to the hearing, Governor Miller addressed a delegation from New York City, composed of several hundred men and women representing civic societies, trade and taxpayers' organizations. He did not attend the hearing.

The hearing was had before the Senate Public Service and Assembly Judiciary Committees, which have custody of the Transit bill. At the beginning of the hearing two hours were allotted to each side to make its arguments.

Purchase Ordinance Passed at Detroit

The ordinance providing for the purchase of eight lines of the Detroit United Railway built under the day-to-day agreement was passed by the City Council on Feb. 24. It will go before the voters at the election on April 4. Approximately 25 miles of trackage are involved in the proposed purchase.

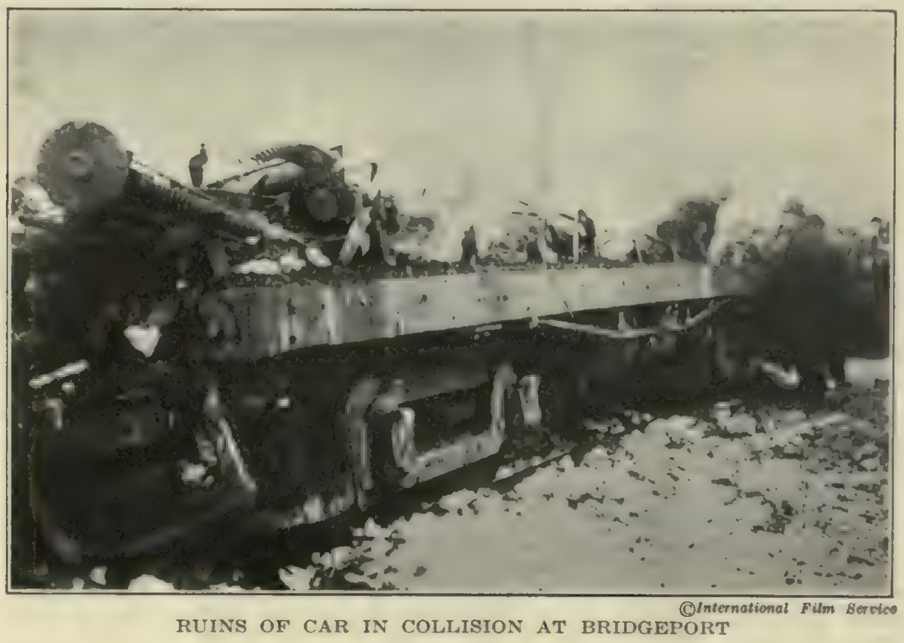
Construction work on the Harper Avenue line was stopped by the Council before the road was ready to operate by rescinding the agreement under which the line was being built. It is not included in the lines named in the purchase ordinance.

Provision for the payment for the day-to-day lines, if purchased, will be made from the $15,000,000 bond issue voted last year.

The service-at-cost ordinance passed out of the Council's hands with the expiration of the thirty days consideration period. No action was taken on the ordinance and according to the provisions of the city charter, it automatically goes on the ballot for the April 4 election.

Responsibility for Connecticut Wreck Not Yet Fixed

No finding has as yet been reached in the matter of fixing the blame of the trolley accident which occurred near Shelton, Conn., on Feb. 22. An inquest was held Feb. 24 by the coroner. There were present at this hearing E. I. Rudd, chief engineer of the Utilities Commission, with two assistant engineers; Manager Porter and Superintendent Kibling of the Connecticut Company; Motorman Sherman and Conductor G. Mills of the northbound car, a claims investigator and many passengers who escaped injury. The coroner's verdict is not expected for several days. The evidence so far brought out would seem to indicate that the inflammable contents of a package being carried by a passenger of one of the cars really was responsible for the high toll of deaths, now numbering ten. The accompanying illustration shows how completely the superstructure of one of the cars was destroyed by fire following the collision.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RUINS OF CAR IN COLLISION AT BRIDGEPORT

Municipal Ownership Election Upheld

The Supreme Court of the United States on Feb. 28 declared legal the election held last April at which the expenditure of $15,000,000 was voted by residents of the city of Detroit, Mich., for the construction by the city of an electric railway. The case was carried to the Supreme Court by the Detroit United Railway after Judge Tuttle in the federal court at Detroit had ruled that no federal question was involved. Judge Tuttle had been asked to enjoin the city from constructing the railway as provided in the plan sponsored by Mayor Couzens.

News Notes

B. J. Arnold Refuses to Quit.—
a letter written to Mayor Thomps
of Chicago on Feb. 21, Bion J. Arno
refused to obey the Mayor's dema
that he "cease to pretend to act"
the chairman of the Board of Supe
vising Engineers. The Mayor h
stated that the board was witho
authority to act on transportati
matters because the 1907 franchises
the companies had been cancelled. M
Arnold said he would continue to pe
form his duties until he had been legal
relieved.

City Official Sentenced.—Charles
Craig, Comptroller of the City of Ne
York, was recently sentenced to six
days in the Essex County Jail in Ne
ark, N. J., by Judge Mayer in t
United States District Court. M
Craig was immediately taken in
custody but has been paroled pendi
an appeal. The charge of contempt
court grew out of a communication b
tween the defendant and Public Servi
Commissioner Nixon in which Mr. Cra
is said to have asserted that feder
justice prohibited investigation by t
city into the records of the Brookl
Rapid Transit lines' receiverships.

**Commission Measure Passed Ov
Veto.**—The veto by Governor Edwar
of New Jersey of the bill creating a ne
three-man public utility commission h
been overridden by the Senate. As so
as the House passes the bill over t
veto it will be a law, and it will the
be the duty of the Governor to nom
nate the commission provided fo
Under the bill, the power of removal
the board is taken from the Governo
and it was because of this feature th
Governor Edwards vetoed the measur
The members of the former commissi
were removed by the Governor. The
carried the case against them into t
courts and the Governor was sustaine
in dismissing them.

Chicago Councilmen to Study M. O.—
Members of the local transportati
committee of the City Council of Ch
cago have arranged to make a thre
weeks' tour of investigation throu
western cities, starting March
Money for the trip was drawn from t
traction fund which has been accu
ulated from payments made to the ci
during the past thirteen years by t
Chicago Surface Lines. The committe
will make a study of municipal owne
ship and operation of street railway
parking regulations, traffic rules, inclu
ing those governing one-way stree
and the skip-stop system. The Alde
men will visit Kansas City, Denve
Salt Lake City, Los Angeles, Sa
Francisco, Portland, Seattle, Vancouve
and St. Paul.

Financial and Corporate

Mr. Seaman Loses

Supreme Court Rules Against Him on One Count in His St. Louis Receivership Suit

The Supreme Court of the United States has overruled the petition of John W. Seaman, represented by Attorney Ephraim Caplan of St. Louis, for a writ of certiorari to review the decision of the United States Circuit Court of Appeals, which recognized the receivership suit filed by Samuel W. Adler against the United Railways, St. Louis, Mo., to the exclusion of Mr. Seaman's earlier suit for a receivership.

The motion for a writ of certiorari was filed in the Supreme Court on Dec. 17. It was the second of two steps which Attorney Caplan took in appealing from the Court of Appeals to the Supreme Court. The other and earlier step was an appeal in regular form. This appeal is still pending. It is not known when the Supreme Court will pass on it.

In the Seaman receivership petition the United Railways was charged with waste of its assets and it was sought to hold individual directors responsible. While this suit was pending Mr. Adler, in April, 1919, filed a receivership petition alleging merely that the company was insolvent. The company promptly admitted its insolvency and Judge Dyer granted a receivership decree and appointed Rolla Wells receiver.

Judge Dyer later announced that the appointment of the receiver was made under the Seaman petition. Before anything could be done to meet the requirements of the Seaman petition, Mr. Adler appealed from this decision and the Circuit Court of Appeals upheld him. This took the case away from Mr. Seaman and removed the requirement for an investigation of the company's affairs before the receivership or for an accounting on the part of the directors. No move for any such investigation has been deemed necessary under the present receiver.

In the appeal petition, which is still pending, the Supreme Court is asked to overturn this action of the Court of Appeals and to reinstate the Seaman petition as the one under which the receivership is decreed. If this should be done Mr. Seaman's counsel would proceed with the movement for an investigation and an accounting.

Scaling Down of Capitalization Suggested

T. Russell Robinson, manager of the Keene (N. H.) Electric Railway, has sent out to bondholders and stockholders of the company a proposition for the reduction of the financial obligations of the company by about 50 per cent and for obtaining $15,000 under a prior lien, to be used to purchase new equipment believed to be essential to enable the road to continue in operation. As a part of this plan the City Councils of Keene have been asked to make a similar reduction in a claim of about $4,800 against the railway company.

It is proposed that the payment of $80,000 of first mortgage 5 per cent bonds due on Oct. 1, 1920, be made by issuing the holders proportionally new first mortgage 7 per cent bonds of a par value of $40,000, to mature in twenty years, subject to a prior lien of $15,000 car trust notes maturing in equal monthly payments over sixty months. If the bondholders consent to accept the new bonds aggregating in value 50 per cent of their present holdings, it is then proposed to reduce the 6 per cent preferred stock of the company from $70,000 to $35,000 and the common stock from $75,000 to $35,000 and if necessary to issue 7 per cent bonds to a certain amount to aid in re-equipping the road.

If the plan of rehabilitation proposed can not be carried out, the manager appears to be of the opinion that the operation of the road cannot continue for long, and in that case, the scrap value of the plant, with its buildings and real estate, might be considerably under $50,000.

The road comprises in the main 10 miles of single track with turnouts, nine cars, two snow plows, carhouse, station and machinery and amusement park equipment at Swanzey.

Massachusetts Commission Will Investigate Abandoned Lines

The Massachusetts Department of Public Utilities has been ordered by the States Legislature to investigate and report on or before April 1, 1921, on the necessity and feasibility of restoration of service on abandoned street railway lines, and also to furnish a comparison of costs of transportation by street cars and auto buses. The order requires investigation of the following specific points:

1. What lines of street railway, whether in operation now or not, are necessary to promote the public welfare and convenience in the localities served?
2. Is it necessary or advisable to provide by legislation or otherwise for the restoration of service on any discontinued lines?
3. Is it necessary or advisable to provide by legislation or otherwise for the continuance of service on street railways now in operation at a popular unit fare, with the additional cost to be borne by the public, and, if so, how should the cost be apportioned?
4. Is it advisable to provide by legislation for the Commonwealth to own and operate lines deemed necessary for the public welfare and convenience?

The department plans to hold a public hearing at an early date.

Three Charters Sought

Receiver of Shore Line Seeks to Expedite Retention of Branches in Operation

Division of the Shore Line Electric Railway of Connecticut into three parts in order better to dispose of the property and to enable it to continue operations is provided in a bill on which there was a hearing in Hartford on Feb. 24 before the committee on railroads of the General Assembly. Robert W. Perkins, the receiver, asks for three charters, each charter to apply to a section of the road.

Edward M. Day, counsel for Mr. Perkins, said that the line from New Haven to Saybrook to Chester had not been operated lately and a section of trackage had been sold to Louis Levinson, New York City; that the line in Stonington and Groton was now being operated, and that the section from Norwich to Westerly was in partial operation though its discontinuance had been authorized by the court.

Mr. Day said the receiver could not sell the entire system, nor sell sections of it and give the purchasers the right to operate, because the charter covered the whole system. The passage of the bills before the Legislature would enable syndicates to purchase the property very cheaply and to continue its operation.

Original Purchaser in Default

Mr. Perkins stressed the point that it was impossible to reorganize and operate the system as a whole. The rails from Chester to New Haven, purchased by Mr. Levinson, were to have been taken up by Dec. 31, but Mr. Levinson had not done so. Mr. Perkins said that he would like to see Mr. Levinson restore the section to operation.

Marion W. Davis, East Lyme, said that he was anxious that trolley service continue for that town. The 6-mile line to Crescent Beach was used a great deal by summer residents.

Charles L. Whittlesey, New London, speaking on the advantage of separating the Niantic-Crescent Beach line from the New London-Flanders section, said that 85 per cent of the traffic was now on the Flanders line while the remainder was for the branch line which, he said, was run at a loss last summer.

Possibility of Junking Road

Mr. Davis said that the fare to New London was at present 40 cents and that he could not see why such a rate should not pay on a run of 11 miles. Mr. Wittlesey's answer was that the Niantic section was not paying and that if some disposition could not be made of it between now and next summer it would be ripped up and sold for junk.

James A. Bathgate, a factory owner of East Lyme, believed that the complete line should be retained for the development of the community. Selectman Charles Cone, East Lyme, said, that people would be content to go without service when traffic was insufficient to defray the cost of operation.

Service Restoration Ordered

Public Service Commission Directs Syracuse & Suburban to Reopen Line—Autos Refused Rights

The Syracuse & Suburban Railway, which suspended operations on Jan. 1, 1921, owing to the alleged impossibility of continuing operations at a profit, has been ordered to restore service between the town of Manlius and the city of Syracuse on March 7. Public Service Commissioner John A. Barhite granted the order for the restoration of service on the complaint of members of the Town Board of Dewitt.

The board maintained that the railway had illegally suspended operations in not gaining the permission of the Public Service Commission as required by law, in which it was upheld by the commissioner. Attorney Paul Shipman Andrews, who was said to be the representative of bus lines interests, endeavored to impress upon the judge that the railway could give no assurance of continual and satisfactory service, owing to its financial condition.

Judge Barhite cited the statement of the company to the effect that it continued to recognize the jurisdiction of the commission and would therefore attempt to reorganize by the stipulated date if weather conditions and equipment would permit. The commissioner stated that if it was then evident that the company could not continue to operate satisfactorily complaints could be brought against it and the question taken care of at the proper time.

C. Loomis Allen, general manager, stated in regard to the possibility of further trouble in negotiating with employees regarding wages that if it became necessary non-union men would be employed, the Syracuse & Suburban forfeiting the right to operate into the city of Syracuse, farther than the corner of Montgomery and Fayette Streets. The cars were formerly operated over a section of the city lines by special arrangement with the New York State Railways, which employs all union workmen.

Bus line interests were unable to obtain franchises for the operation of automobile buses over the old suburban route, owing to the fact that the town of Dewitt and the village of Manlius opposed any substitution for the street cars until it was proved that electric railway service could not be regained.

California Tax Measure Attacked

A bill similar to the so-called King tax bill, previously passed in the Senate of California, but defeated in the Assembly, has been advanced for reintroduction and consideration in the Senate. This measure proposes to raise the $14,000,000 deficit in the state's budget for the next two years by increasing the tax rates on gross income of public service corporations 34.98 per cent (railroads, street railways, for example, from 5¼ per cent to a fraction over 7 per cent) and by increasing the taxes on banks, franchises and insurance companies a like amount.

The committees in the Senate and Assembly called upon the public utilities to be represented in an open hearing in order to discuss this taxation measure. These representatives of the public service corporations, by their frank submission of facts and figures, succeeded in defeating the bill at its first introduction.

Public service corporations claim this bill unfair, unwise and unnecessary, as the utilities are already taxed more in proportion to value than other property. Should the King tax bill be approved the Pacific Electric Railway would pay 130 per cent increase over the taxes it paid the state during the period 1915-1916.

The utilities consider the measure unwise since it would compel them to raise their rates if they are to show earnings which will attract capital for expansion. The measure is also considered unnecessary if certain economies are practiced by the state. A reasonable tax in this situation is suggested to be one related directly between the expense of creating and maintaining the state's system of public highways and those who derive the benefits therefrom. For permanent improvements, which it is now sought to pay out of current revenues, it is recommended that bonds be issued.

Since the adjournment of the first session of the Legislature, Governor Stephens has personally and actively stumped the state in favor of the King tax bill, endeavoring to obtain support of this measure when it is brought up for reconsideration at the second session of the Legislature, convening on Feb. 24.

Only $36,253 Available for Dividends in Louisville—Appraisal Proposed

Stockholders of the Louisville (Ky.) Railway and the Louisville & Interurban Railroad re-elected directors and officers at the annual meeting on Feb. 16. J. P. Barnes, president, told stockholders that J. G. White & Company, New York, had been engaged to make a detailed inventory and valuation of the company's urban property to set at rest criticism that the company is overcapitalized.

The balance available for dividends on stock at the end of 1920, Mr. Barnes stated, was $36,253, as compared with $157,504 in 1919 and $424,108 in 1918. The operations during 1919 were affected by the strike of employees, he pointed out.

Mr. Barnes declared the policies of the directors and officers were shaped toward the carrying out of the following obligations:

1. To render adequate service to the public of Louisville.
2. To maintain an adequate living wage scale for our employees.
3. To pay a reasonable rate of return on the amount invested in the property used in the service of the public.

Holding Company Eliminated

$15,000,000 of Stock Wiped Out—Local Control for the Buffalo Company Under Mitten Management

The board of directors of the International Railway, Buffalo, N. Y., on Feb. 25 closed a contract by which the Mitten Management, Inc., will supervise the management and rehabilitate the International Railway property. The undertaking is very similar to the arrangement under which so much has been accomplished during the past ten years in Philadelphia.

DIRECTORATE UNCHANGED

The board of directors of International Railway remains unchanged. T. E. Mitten is chairman of the executive committee, H. G. Tulley will continue as president of International. Thomas Penney is the vice-president and general counsel, Edgar G. Dickson, vice-president in charge of operation, and C. A. Chavel, auditor. Carl A. Weber is appointed secretary and treasurer.

A careful and complete survey and analysis of the International system and service will be at once undertaken by Mitten Management experts under direction of President Tulley, in an endeavor to give to Buffalo the best possible railway service. To that end the suggestions and kindly co-operation of the car riders and the community is being solicited.

The International Traction Company is now a thing of the past. Its $5,000,000 of preferred stock and its $10,000,000 of common stock, issued at the time of the 1901 consolidation, have been completely wiped out. The stockholders of the underlying company, the International Railway, have been obliged to foreclose and take their property back.

Under the plan of reorganization now made effective, the International Railway stockholders were required to pay in new money. Nearly $4,000,000 was needed to put the International Railway in a position to pay its obligation and to relay worn out tracks so that the city paving of streets might be no longer delayed.

More than one-half of the entire issue of International Railway stock is now owned in the city of Buffalo and vicinity.

FORECLOSURE PREVENTED

In the annual report the company's operating revenue for the year ending Dec. 31, 1920, is given as $11,294,117. Operation and taxes amounted to $9,616,489, leaving an operating income of $1,587,628, which when added to the non-operating income, makes a gross income of $1,657,207. This gross income is entirely wiped out by interest, rentals and amortization of discount.

In setting forth the protective committee's reorganization plan in detail it is remarked that the initial responsibility confronting the committee was to prevent a receivership or foreclosure of the International Railway refunding nd improvement 5 per cent mortgage n case of default. The committee made oans to the company amounting to 2,070,189. This debt was afterward ancelled by the committee. This act epresented in effect a contribution of hat amount to the company.

ermission to Sell Stock Refused by Cleveland Council

Permission to sell approximately 1,600,000 of Liberty Bonds held by the ompany is to be asked of the Cleveand City Council by the Cleveland ailway according to announcement nade by officials of the railway and 'ielder Sanders, City Street Railway ommissioner. The bonds are to be old at current market prices and the oss on them is to be amortized out of he earnings.

If the City Council permits the sale f the Liberty Bonds, the money will e used to take up short time notes of he railway now held by Cleveland anks. These total almost $1,370,000. he proceeds of this loan have already een used in making extensions and mprovements and all but $74,000 of he company's Liberty Bonds are ledged as collateral for the notes.

The company's request to sell its iberty Bonds comes as a result of the ity Council's refusal to permit the ompany to sell $3,000,000 par value of ew stock at 80 and to amortize the iscount from par out of earnings.

Opposition to the proposed sale of tock at 80 was led by the Cleveland *ress*. The paper insisted that the ompany should raise new capital hrough the sale of bonds. The comany officials, however, are opposed to his and say that no extensions, imrovements or betterments can now be nade.

Receivers at Spartanburg

George B. Tripp and J. B. Lee have een appointed temporary receivers of he South Carolina Light, Power & Railways Company, owners of the Gaston Shoals power development in Cherokee County, the gas plant, the street railway line and electric lighting system f the city of Spartanburg, S. C. The appointment was made by Judge H. H. Watkins of the United States Court of he Western District of South Carolina. Mr. Tripp is vice-president and general nanager of the company and Mr. Lee s president of the Bank of Commerce, Spartanburg.

The action of the court was in the ase of the General Electric company, New York, complainant, against the South Carolina Light Power & Railways Company, defendant, in which it s alleged the company is indebted to he complainant in the sum of $13,358 he payment of which sum has been luly demanded but remains unpaid.

The court's order naming the receivers concludes by directing the parties o the case to appear on March 17 to show cause why the receivership should not be continued during the pendency of he suit.

$1,333,811 Reduction in P. R. T. Income

Deficit of Philadelphia Rapid Transit Under Five-Cent Fare Not All Made Up by Increased Fare

The serious financial condition that confronted the Philadelphia Rapid Transit Company when it actually increased fares in the latter part of 1920 is reflected in the report of the company for the year 1920. While merchandising methods did influence riders to some extent to pay double 5-cent fares instead of using transfers the gain in revenues was far from being sufficient to meet the rapidly accruing deficit.

ON NOV. 1 the basic fare was increased from 5 cents to 7 cents with no change in free transfer privileges or 3-cent exchange regulations. Reduced rate tickets were also established and sold four-for-a-quarter. During the last two months of the year revenues increased $1,304,002 even though traffic fell off 5,223,601 passengers over the corresponding period of the previous year.

The report reviews the endeavor of the company to add to its revenues from the time the Stotesbury-Mitten management took hold in 1910 to date. Among other things, attention is called to the average gain in per capita riding of 74 per cent in Philadelphia as against 27 per cent in Detroit, Cleveland, Buffalo and Chicago in that period. This gain is held to be attributable to short distance riding. By means of consistent educational methods, this has grown in 1920 to 180,000,000 passengers a year and represents more than $7,000,000 of added revenue.

As to industrial relations, the report points out that two changes in wages were made during the year, the last of which increased the maximum rate to 72½ cents an hour. This rate, however, although retroactive to June 1, 1920, did not actually become payable until Nov. 1, when the higher fares became effective. The back pay with interest was disbursed to all employees on Feb. 1. The basic rates for wages are the average of those paid to trainmen in Chicago, Detroit, Cleveland and Buffalo. Reduced wages in any of these four cities will automatically serve to reduce the wages paid in Philadelphia.

In speaking of the operation of the Frankford "L" for the city, the report states that this is made difficult because of the misinformation originally fed to the public as to the probable earning power of the extension. Even now, the Market Street subway-elevated, built in days of much lower prices and in operation since 1907, is just beginning to earn 6 per cent upon its actual cost. In the meantime real estate operators have benefited by this improvement and the assessed values on property in West Philadelphia have increased $113,000,000. It is said that the increased valuation of properties directly affected by the Market Street rapid transit line is as much as 98 per cent.

INCOME STATEMENT OF THE PHILADELPHIA RAPID TRANSIT COMPANY

Year ended Dec. 31	1920	1919	Per Cent Change
Gross passenger revenue	$37,989,623	$34,739,589	+9.36
Other operating revenue	817,731	618,882	+32.13
Total railway operating revenue	$38,807,354	$35,358,471	+9.75
Way and structures and equipment—Maintenance and renewals	$5,595,600	$4,707,012	+18.85
Power—maintenance and operation	3,728,027	3,450,486	+8.04
Conducting transportation	13,748,926	11,387,653	+20.78
General	3,521,359	2,697,091	+30.50
Total railway operating expenses	$26,593,912	$22,242,242	+19.55
Net operating revenue	12,213,442	13,116,229	—6.87
Taxes, including paving tax	$2,601,253	$2,345,750	+10.87
Operating income	$9,612,189	$10,770,479	—10.74
Non-operating income	$592,986	$681,049	—12.90
Gross income	10,205,175	11,451,528	—10.88
Interest	$976,463	$927,926	+5.24
Rentals	8,726,647	8,687 725	+0.45
Sinking fund—city contract	120,000	120,000	0.00
Total deductions	$9,823,110	$9,735,651	+0.90
Net corporate income	$382,065	$1,715,877	—77.90

STATISTICAL INFORMATION OF THE PHILADELPHIA RAPID TRANSIT COMPANY

	1920	1919	Per Cent Change
Average total miles operated	671.77	671.42	+0.05
Revenue car-miles to car-hours—speed in M.P.H	9.33	9.07	+2.86
Revenue passengers at 5 cents	(*c*)	671,652,444	......
Revenue passengers at 7 cents	(*c*)	....	......
Total revenue passengers	704,557,608	671,652,444	+4.90
Revenue exchange passengers at 3 cents ( )	55,233,232	51,675,791	+6.88
Free transfer passengers (*b*)	154,079,623	149,427,164	+3.11
Total passengers handled	913,870,463	872,755,399	+4.71
Gross passenger revenue	$37,989,623	$34,739,589	+9.37
Average fare—per revenue passenger	5.40	5.18	+4.25
Average fare—per total passengers handled	4.15	3.98	+4.25
Revenue per mile of track	$56,550	$51,800	+9.17
Operating ratio—per cent	68.5	63.0	+5.50
Taxes, per cent of gross revenue	6.70	6.52	+0.18

(*a*) 536 points in 1919 and 537 in 1920. (*b*) 333 points in 1919 and 336 in 1920. (*c*) Not available.

With the increased cost of operation it is not now thought that the Frankford "L" can earn much, if anything, in excess of its operating cost. For that reason the company urges that new estimates be made as to the earning power of these lines operated independently and as an integral part of the Philadelphia Rapid Transit System.

The city is also urged to ask the Public Service Commission to participate in the conferences leading up to the execution of the Frankford "L" operating contract. This, if done, should insure against a repetition of the refusal to approve, which was the fate of the proposed 1918 city contract, and will offer opportunity for the consideration of such fare adjustments as may be necessary to assure the payment of the forementioned 5 per cent return.

The accompanying income statement for the past two years indicates that operating expenses have more than kept pace with any growth in gross revenue. In 1920, notwithstanding the increased fare during the last two months, the gain was far from being sufficient to wipe out the early losses of the year.

Statistical information compiled from various sources indicates that the losses in traffic due to the 7-cent fare have by no means been such as to wipe out entirely the normal increase for the year.

Capital Traction Favors Consolidation

George E. Hamilton, president of the Capital Traction Company, Washington, D. C., has set forth in a letter to a member of the district committee of the House the attitude of the company toward the proposed merger with the Washington Railway & Electric Company. Among the elements that Mr. Hamilton says should be taken into account in any such change are cited the following:

1. A merger should include the property of both companies, the lines within and without the District of Columbia, and the Potomac Electric Power Company.
2. The basis of merger should be the relative earning or exchange value of the companies.
3. A provision for service at cost, in order that the rate of fare might be automatically adjusted to conditions.
4. A management that would command the confidence of the public and the security holders, and in this management, as well as in the negotiations for merger, the public should have representation.
5. A plan of merger so worked out and approved by the Commissioners should be submitted to the stockholders of the respective companies for their consideration, and if approved by them reported back to the Commissioners.

Mr. Hamilton sums up the matter:

> Congress may have the power, but I doubt its right, through the imposition of excessive taxes and otherwise, to hamper and destroy these properties. It has the power to penalize through taxation, but I do not believe that Congress, in its wisdom, desires to so use its power. My belief is that Congress desires by legislation, helpful to the companies and protective to the public, to encourage and provide for a right conclusion and consolidation through a fair agreement of merger, and in this effort and direction it will have our cordial co-operation. My associates in the company and I are in favor of such a consummation, and if Congress would enact a law permitting a merger, I believe the wished-for consolidation could be brought about voluntarily in the near future by the parties in interest.

Financial News Notes

Interurban Decides to Quit.—The stockholders of the Morgantown (W. Va.) Interurban Railway have decided to discontinue business and surrender the company's charter.

Commission Appraising Kalamazoo Lines. — The Public Utilities Commission of Michigan is engaged in appraising the lines of the Michigan Railway in connection with the fare case now pending before the commission.

Cars Seized to Secure Payment of Fares.—Two cars of the New Paltz, Highland & Poughkeepsie Traction Company, New Paltz, N. Y., have been seized by the sheriff and advertised for sale for non-payment of taxes amounting to $1,500.

Interurban Declares Initial Dividend.—The Rochester & Syracuse Railway, Syracuse, N. Y., has declared an initial quarterly dividend of 1 per cent on the $2,500,000 non-cumulative preferred stock, payable on March 15 to stockholders of record March 1, 1921.

Tulsa Lines Plan to Consolidate.—The Tulsa (Okla.) Street Railway and the Oklahoma Union Railway, which also owns and operates at Tulsa, are negotiating for consolidation of the two systems. Details of the plan have not been announced, but it is known that it is planned that the Tulsa Street Railway will take over the city lines of the Oklahoma Union Railway, leaving the latter company to operate its interurban properties without the hindrance of the local lines.

Note Issue Quickly Subscribed.—Stone & Webster, Boston, Mass., announce that their Texas property, the Galveston-Houston Electric Company, has sold $250,000 of five-year 8 per cent notes. This issue was offered to employees and patrons of the company at par, and within one week was entirely taken up by this class of investors. The purpose of the issue is to complete needed trackage in the downtown district of Houston for the purpose of relieving traffic congestion.

Southern Pacific Plans Abandonment.—The Southern Pacific Company has informed the Railroad Commission that it proposes to abandon a material part of the electric service operating over the terminal property at Oakland, Cal. It is proposed to abandon the electric lines and service between the property along Webster Street to and across the drawbridge and over San Antonio estuary; to discontinue the operation of the so-called Fourteenth Street trains now operating between Alameda Mole and the Fourteenth Street terminal property, together with the operation of street cars which now run between Alameda and the depot.

Kansas City Must Act Quickly.—I a speech made recently in Kansas City Mo., Francis M. Wilson, one of th receivers of the Kansas City (Mo. Railways, said that only fourteen o the thirty-five lines of that company are paying the cost of operation. Th outlying lines are making no money He regards the forced sale of the properties to be inevitable, unless the revenues of the company are built up. I the receivers are unable to make any progress the court will be quick t realize that nothing more can be done Under forced sale only the first mortgage bondholders would be likely t receive anything. The second mortgage bondholders and the stockholders would be wiped out. All claims now piled up and pending against the company, including those of the city would also be unpaid. He asked his audience to contemplate such proceeding in its effect upon the city of Kansas.

Preferred Stock Sold to Employees and Customers. — The San Antonio (Tex.) Public Service Company has just placed on the market an issue of $2,000,000 of cumulative preferred stock yielding an annual return of 8 per cent. This stock is being sold to employees and customers and the selling is being done principally by the employees. At the end of the first month approximately $80,000 of this stock was sold. In order to give the customers the best information possible and the kind of service to which they are entitled an investment department has been organized. This department is in charge of S. J. Ballinger, commercial manager of the company. Just enough salesmen are kept in the investment department to take care of inquiries and assure the proper treatment. No effort is made to secure experienced stock salesmen. Company employees who are familiar with the business and know how to be polite and courteous to the public are used as special salesmen.

City to Appraise Utica Lines.—The city of Utica, N. Y., has retained three auditors of Milo R. Maltbie, public utility consultant, to appraise the Utica holdings of the New York State Railways in the fight of the municipality against an increased fare. The company placed a petition before the Common Council of the city some time ago asking for a fare increase on the grounds that the present fare was inadequate and was forcing them to operate at a loss. Following the city's refusal to consider the proposition the company curtailed service to a considerable extent. The corporation counsel of Utica procured an order from the Public Service Commission instructing the company to restore normal service. The company then filed a demand for a 10-cent fare with the commission. To date the railway and city officials have been patiently awaiting settlement by the commission. The engagement of the accounting experts by the city is the first local development in the tangle since negotiations began.

Traffic and Transportation

Director Stops Increase

incinnati Traction Company Prevented by City from Putting Nine-Cent Fare Into Effect

A temporary injunction issued by udge Stanley Matthews, of the Com- ion Pleas Court, on Feb. 24 prevented he Cincinnati (Ohio) Traction Com- any from increasing fares on its lines nother half a cent to 9 cents on March . In the meantime fares will con- nue at 8½ cents.

Walter Draper, vice-president of the ompany, announced the increase on eb. 16. W. C. Culkins, director of treet railways, promptly announced at proceedings would be instituted to njoin the fare increase. The company ontends that a deficit exists. No efinite date has been set for the hear- g.

CITY CAN REFUTE CHARGES

The basis of the city's suit to enjoin e 9-cent fare was its claim that no eficit exists, according to the city's ay of figuring. To this Alfred Cas- ett, attorney for the company, nswered that the company resented e implication that it was not acting good faith when it presented figures owing such a deficit to exist.

In rendering the injunction Judge atthews said the company can ask for dissolution of the temporary order henever it is ready to offer evidence gainst the charges of the city, or the ty solicitor can, whenever he desires, k for a final hearing on his petition r a permanent injunction.

Indications are that in the meantime illiam C. Culkins will attempt to push egotiations for a reorganization of the mpany. He believes this will do away rmanently with conditions that have ecessitated fare increases in the past.

In his petition City Solicitor Zielonka arges:

> That the traction company has from time time increased fares upon the "pretended aim that gross receipts have been in- fficient."
>
> That if car fares were allowed to go to cents the volume of passenger traffic uld be reduced.
>
> That increased rates would not produce ger gross receipts.
>
> That there is no deficiency existing in ecember and January gross receipts.

In addition to the traction company e Cincinnati Street Railway and the hio Traction Company were named fendants in the suit. Mr. Zielonka serted it was necessary to name all e companies because of this inter- lation to one another.

Officials of the Cincinnati Traction ompany insist a deficit of about $125,- 0 existed in receipts for December d January and that the total deficit operating expenses is more than 65,000.

Commissioner Culkins contends $350,000 of the alleged deficiency is represented in a suit filed by the city to recover that amount from the Ohio Traction Company, the Cincinnati Car Company and the traction company. About $333,000 more is represented in over-expenditures by the company last year, Mr. Culkins says. The traction company exceeded its budget by that amount, he says and he refused to approve the expenditures.

Accidents Diminish with Experience

An interesting exposition of the influence of experience of trainmen on the accident record is afforded by the comparative statistics of the Kansas City (Mo.) Railways Company for December, 1920, and December, 1919. It will be recalled that in 1919 the company was going through the ordeal of building up a completely new transportation organization, made necessary by the strike in December, 1918. At the end of 1919 a large part of the force was still inexperienced, while by the end of 1920 the turn-over had been greatly reduced and the average amount of experience had substantially increased. The result is clearly reflected in the following accident figures for December:

	Vehicle Accidents	Railway Car Collisions	All Classes of Accidents	"Blind" Accidents
1919...	631	87	1,050	61
1920...	468	31	806	38
Decrease	163	56	244	23

Des Moines Losing on an Eight-Cent Fare

In spite of an 8-cent fare the Des Moines (Iowa) City Railway did not make as much money during January, 1921, as it did during January, 1920, when the 5-cent fare was in effect. According to the report of Scott Goodrell, the city supervisor, to the City Council, the deficit in January this year was $13,923, whereas in January, 1920, there was a nominal profit of $2,767. Costs incident to a 40 per cent increase in service which was made effective at the time the 8-cent fare was authorized are blamed for the loss as compared to the figures of a year ago. Mr. Goodrell is authority for the statement that the twenty buses now operating in Des Moines are responsible for a cut in income of the railway amounting to $21,000 a month. He estimates that each of the buses is carrying 700 passengers a day.

The application of the city to nullify the 8-cent fare is referred to on page 469.

Hearing on Jitney Regulation

Demand in Connecticut that Bus Be Restrained and Made Subject to Same Obligations as Trolley

The unregulated jitney bus has encountered an added opponent in Connecticut through the alliance of the Federation of Labor of that State with the railway interests in support of a bill now before the Legislature. At a hearing before the judiciary committee at Hartford on Feb. 15 Ira M. Ornburn, representing the federation, said that the bill was introduced at the request of the labor organization. He believed the motor vehicles had entered into unfair competition with the electric railways and argued that they should be subject to the same operating tax as the trolleys. He believed further that the buses should not be allowed to operate on streets where there were car lines.

J. T. L. Hubbard, Bridgeport, attorney for the Park City Bus Association, surprised the committee by stating that he himself favored regulation of the jitneys by the Public Utilities Commission. He picked flaws in the measure under consideration with such apparent success that the bill will undoubtedly be materially amended before it is reported by the committee. Mr. Hubbard stated that he had framed a bill also before the Legislature which provided for regulation of motor vehicles with certain restrictions and conditions. The bill before the committee Mr. Hubbard characterized as impracticable and impossible of operation.

L. S. Storrs, president of the Connecticut Company, was asked whether, if jitney competition were entirely stopped, the railway could pay its taxes to the State. He replied that he could not tell, but stated that if the jitneys were eliminated the direct revenue to the trolley would be from $750,000 to $1,000,000 more than at present.

C. S. Brody, Bridgeport, representing another association of jitney men, said the supporters of the bill evidently thought it more important to keep the Connecticut Company alive than to serve the public. The bill, he said, would eliminate jitneys and the people of Bridgeport didn't want them eliminated. He stated that the bus owners were willing to accept reasonable regulation and a reasonable tax.

Major J. Moss Ives, receiver of the Danbury & Bethel Street Railway, said the road was running behind $40,000 and $50,000 a year in operating expenses due to unfair jitney competition. The past two years the road has not been able to pay the $12,000 taxes due the state, which could have been paid had jitney competition been eliminated by the 1919 Legislature.

Shreveport Fare Case Appealed

Appeal has been taken to the Supreme Court of Louisiana by the Shreveport (La.) Traction Company of the case before Judge Hand where the court held that the referendum election of May 18 was illegal in which the voters authorized the company to increase fares from 5 cents to 6 cents until Dec. 31, 1923. The court ruled in substance that technical requirements of the law had not been met in submitting the measure and that the granting of a new fare charge or increase in rates was the granting of a new franchise. In the event that a retrial is denied an appeal will be taken to the Supreme Court.

The case against the company was brought by H. P. Long, Jr., a member of the Shreveport bar. He questioned the validity of both the ordinance and the election.

The request for an advance in fares had its origin in an appeal by the employees of the railway last spring for an increase in wages. The company was then paying motormen and conductors 33 to 43 cents an hour. The books of the company were opened to the men by the railway to prove that under the fare then in effect it would be impossible to grant the request for an advance in pay. The men then suggested to H. B. Hearn, president and general manager of the company, that he go before the people and ask their permission to increase fares. This Mr. Hearn did with the full approval and backing of his employees.

Nothing Constructive Done at New Orleans

At the instance of Paul H. Maloney, Commissioner of Public Utilities of the city of New Orleans, La., an audit made by A. C. Moffat, secretary of the Sewerage and Water Board of New Orleans, discloses that the service-at-cost plan advocated by Eastern bankers, assuming the valuation of the New Orleans Railway & Light Company to be $40,000,000, would necessitate a fare of 6.8 cents, just to pay operating expenses and a 6 per cent guarantee to investors.

The audit of the books of the company covered the period from Oct. 22, 1920, to Dec. 31, 1920. The 8-cent carfare went into effect on Oct. 22, 1920. The valuation of $40,000,000 was used merely as an illustration and is not accepted by the city. The representatives of the company fixed the valuation at $55,000,000 and the Ballard report fixed the value at $35,000,000.

Mr. Moffat has been asked to make an audit through January.

The critical situation in which the New Orleans Railway & Light Company now finds itself impelled Judge Rufus Foster of the Federal District Court to call a conference on Feb. 25 in the federal court building. The purpose of the meeting was not disclosed in advance, but it was surmised that the probable rejection of the service-at-cost plan, advocated by the receiver and representatives of the security holders makes it imperative that some temporary settlement of the railway situation should be reached at once. The 8-cent fare ordinance will expire on April 1.

Routing and Other Changes Contemplated at Toledo

Drastic changes in routing and schedules of the lines of the Community Traction Company, Toledo, Ohio, the abandonment of some lines, and the regulation of jitney buses may be put into effect by the board of control. Before making any general recommendations, however, Wilfred E. Cann, Street Railway Commissioner, will probably await the report for the first month's operation under the Milner service-at-cost ordinance.

Checkers at work collecting data on the operation of the jitneys discovered one day recently that 9,414 persons rode that day on buses. The check was made on the Oak, Cherry, Dorr and a few other lines at busy points. Figuring the fares of these bus patrons at 6 cents the jitneys deprived the railway of at least $584 of revenue. On the basis of this and subsequent counts it has been estimated that the jitneys are depriving the railway of approximately $425,500 a year.

Commissioner Cann and Law Director James Martin have been working on an ordinance to regulate the motor traffic. The railway officials are not opposed to jitney competition on a fair basis and are not opposed to the operation of jitney lines which do not compete with the railway. They are hopeful that a form of auxiliary service may be worked out for the buses.

The names of the engineering and auditing assistants are given on page 471 of this issue.

Louisville Badgers Its Railway

It will probably be at least eight or ten weeks before the appeal of the city of Louisville, Ky., from the Federal injunction permitting the Louisville Railway to collect a 7-cent fare, can be decided by the Federal Court of Appeals at Cincinnati. In the meantime the City Council and some of the smaller publicity seeking attorneys are doing their utmost to harass the company. An instance of this is supplied in the suit filed against the company for recovery of 4 cents.

Another stab at the railway is an ordinance which seeks to remove all bars from jitney bus operations. The present ordinance provides a license of $50 for the first bus, and $10 for each additional. The new ordinance would put a flat rate of $10 license on the first and all other buses. It would also substitute a surety bond in place of the present real estate bond of $5,000.

City Attorney Lawton has been investigating the law to decide whether a mandamus proceeding could not be brought against Federal Judge Evans, at Louisville, to compel the company to issue receipts for all 7-cent fares so as to enable the public to collect overcharges in the event the upper courts hold with the city against the railway.

The City Council has set aside a fund of $25,000 to be used in defraying legal expenses in making its fight on the railway. Part of this will be used
in investigating the assessable value
the company's property, with the pl
of forcing payment of back taxes.

The county is also planning to doul
or triple the assessment of the co
pany's property for taxation purpos

Court Doesn't Propose Railwa Shall Share Assets with Public

Federal Judge Robert E. Lewis
Feb. 16 granted the city of Denv
Col., permission to intervene in t
Denver Tramway's petition for i
creased fares. The court entered
order making the city a party to t
proceedings evolving from the petiti
filed by Ernest Stenger, receiver for t
company, asking for a 10-cent fa
The city has ten days within which
file its answer to the petition. T
case has been set for final hearing
the United States District Court, Di
trict of Colorado, on March 1.

Following an application by the ci
of Denver in which it sought to ha
the proceedings instituted by the r
ceiver dismissed on the ground that t
federal court has no jurisdiction in t
matter, Judge Lewis ruled that t
court has jurisdiction over the settl
ment and emphatically declared th
relief of some kind was imperative
the company and that it would
granted, stating in part:

> This court has neither the power nor t
> disposition to continue a condition whi
> will result in taking away from the stoc
> holders of the tramway its property a
> distributing it among the public.
>
> There is no community in the count
> that wants public service furnished it
> a charity basis. In fact even were th
> community willing to take service from t
> tramway upon such a basis, it would
> discontinued for lack of assets.
>
> If the contentions of the petitioneer r
> garding the condition of the tramway
> correct, and there is nothing before th
> court to show that such contentions a
> not correct, then relief of some sort is in
> perative, and this court proposes to see th
> it gets all the reasonable relief possible
> give it.

Seven-Cent Fare Asked in Dalla

The Dallas (Texas) Railway, havin
been halted in its negotiations with th
city of Dallas for a revision of its pre
ent franchise so as to embody the re
service-at-cost features under which th
company would be guaranteed a n
return of 7 per cent on its investe
capital, has renewed its request for
7-cent fare. A statement is now bein
prepared by the company's officials f
presentation to the City Commissio
setting forth in detail the financial co
ditions of the company and showing th
urgent need for an increased fare.

In discussing the application, Richar
Meriwether, vice-president and gener
manager, said that if the compan
were forced to go into the feder
court and seek an increased fare o
the ground that the present fare is co
fiscatory, an 8-cent fare will be aske

J. F. Strickland, president of th
company, and other officials who hav
been taking part in the new franchis
negotiations have agreed to let thes
negotiations drop for the present, if th
city will act on the increased fa
question.

Bondholders Go on Strike

The Public Service Commission of Indiana will rule on the Lafayette Service Company's plea for increased fare within the next few weeks. Fred B. Johnson, commissioner, after listening to the evidence presented by the company at a public hearing in Lafayette recently, has taken the matter back to the commission for consideration.

The company presented financial statements for the seven months' period from May 1, 1920, to Nov. 30, 1920, in which it was shown several of its lines were operated at a loss. The company is asking to have the city fare increased from 5 cents to 6¼ cents with a 10-cent fare for a single ride if tickets are not bought. A 20 per cent increase in suburban fares also is asked.

Charles Niezer of Fort Wayne, attorney for the company, told Commissioner Johnson that unless the company received relief it would have to suspend operations. The tracks are in bad condition, and the bondholders, R. W. Levering, manager, testified, will allow the line to be junked before they will invest any more money under existing conditions. Jitneys, operating between the city and Purdue University, it is said, take more than $100 a day away from the railway.

Transportation News Notes

Seven-Cent Fare Refused.—The Public Service Commission of Pennsylvania has denied the application of the Warren Street Railway to increase its fare from 6 cents to 7 cents. The commission authorized the 6-cent fare in December, 1918.

Ten Cents Cash in Everett.—By a recent order of the Public Service Commission fares on the railway lines of the Everett Railway & Power Company, Everett, Wash., have been advanced from 5 cents to 6¼ cents on a token basis, with a 10-cent cash fare. The order became effective on Feb. 3.

Fare Rise in Mansfield.—The Richland Public Service Company operating in Mansfield, Ohio, has been granted a fare rise from 7 cents cash to 8 cents cash, with seven tickets for 50 cents. Recently the company petitioned the City Council for a 10-cent cash fare and six tickets for 50 cents. The old rate was 7 cents cash with four tickets for 25 cents.

Fare Rise Approved.—The Alabama Public Service Commission in a recent order has given permission to the Alabama Power Company to charge 7 cents on its lines in and between Attala, Alabama City and Gadsden despite the opposition of the City Councils of Gadsden and Attala. It is provided that tickets will be sold at the rate of 16 for $1. The company will be required to issue transfers on any one line to any other line.

Eight Cents in Findlay.—The Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, has accepted the service-at-cost grant passed by the Council of Findlay. March 17 has been set as the date for the new 8-cent fares to go into effect. At present the company is permitted to charge only a 5-cent fare. The new rate of fare will prevail for the first three months under the franchise.

Cultivation of Riders Planned.—The Tacoma Railway & Power Company, Tacoma, Wash., has announced that although six months' operation under the present 10-cent cash fare, with 8-cent tickets, shows the company is not making enough above operating expenses to pay interest on its indebtedness the company does not contemplate asking for an increase in fares. An effort will be made by the company to get more persons to ride in cars.

Five-Cent Fare Ordered Restored.—Judge J. C. Hutchison, sitting in the United States court for the Southern District of Texas, at Houston, has handed down an opinion refusing to enjoin the city of Galveston from enforcing an ordinance directing the Galveston Electric Company to discontinue collection of 6 cents from railway patrons and to collect the old fare of 5 cents. The ruling will be reviewed at length in an early issue of the ELECTRIC RAILWAY JOURNAL.

Increased Rate in Guelph.—The Private Bills Committee of the Ontario Legislature has approved an increase in fares on the Guelph Street Railway from 5 to 7 cents, with four tickets for 25 cents. The city solicitor of Guelph informed the committee that the railway, which is operated by the municipality, had a deficit of $13,000 last year and $11,000 in 1919, and that the Hydro Electric Power Commission of Ontario had advised increased fares as the only means of overcoming the deficits.

Des Moines Case Heard by Full Court.—The application of the city of Des Moines, Iowa, for a writ in supersedeas to nullify the 8-cent fare ordered allowed by Judge Martin J. Wade a few weeks ago, will be heard on March 4 at Kansas City by a full bench of the United States Circuit Court of Appeals. The hearing was originally set for Feb. 25, but was postponed. Efforts of the attorneys for the city will be to return to the 6-cent fare pending a hearing upon the merits of the 8-cent needs.

Schenectady Fares Increased.—The Public Service Commission for the Second District has authorized the Schenectady Railway to discontinue the sale of commutation, round trip and other special rate tickets on its different divisions. The order provides that the company may charge $5 for a fifty-four-trip book covering the ride between Schenectady and Albany and with the city fares of 7 cents in each city the rate is $12.56 against the present rate of $10.40. The company in its application asked for $13.50. The new rate on the Troy line, where there was a charge of $10.40, will be $13.50.

Higher Fares Granted in Sherbrooke.—The application of the Sherbrooke Railway & Power Company, Sherbrooke, Que., for increased fares has been granted by the Public Utilities Commission of Quebec, Canada. The new rates went into effect on Feb. 1, and are as follows: Adults, cash fare, 10 cents, or six tickets for 50 cents; children, cash fare 4 cents, or eight tickets for 25 cents. After midnight, 15 cents cash will be the fare for each passenger. Transfers are provided without extra charge. Under the old schedule the cash fare was 8 cents, or four tickets for 25 cents.

Six Cents in Elmira. — The Public Service Commission has granted permission to the Elmira Water, Light & Railroad Company, Elmira, N. Y., to advance its rates on lines within city limits to 6 cents; Rorick's Glen, Elmira Heights and other points outside the city will be 7 cents; to Horseheads the fare will be 13 cents. The new rates went into effect Jan. 30, 1921. Superintendent Maloney commenting on the commission's decision has said that the company will really be no better off than it was a year ago with the 5-cent fare due to the change in conditions and the falling off in traffic.

Three Cents a Mile in Pontiac.—The Bloomington, Pontiac & Joliet Electric Railway has put into effect a straight 3-cents-a-mile fare on its lines in Pontiac. Last June the Illinois Public Utilities Commission granted the company permission to increase its fares to 3 cents, but another ruling of the commission provided that when tickets were purchased the fare would be 2½ cents a mile, while cash fare paid on the cars would be at the rate of 3 cents a mile. Since the steam roads are charging 3.6 cents a mile the Bloomington, Pontiac & Joliet Electric Railway petitioned the commission for permission to charge 3 cents a mile regardless of ticket sales or cash fares. The new ruling became effective Feb. 1.

Seven Cents Authorized in Clinton.—Under a recent ruling of Judge A. P. Barker, the Clinton (Iowa) Street Railway has been authorized to charge a 7-cent cash fare with four tickets for 25 cents. The company was collecting 6 cents and had petitioned for 8 cents. The fare controversy in Clinton dates back several months when the railway raised its cash fare from 5 to 6 cents to meet the demands of its employees who were seeking an increase in wages. Prior to this the City Council of Clinton had refused the petition of the railway for authority to raise its fare to 7 cents. An appraisal of the railway's property followed and the opinion of Judge Barker permitting the 7-cent fare is based on this appraisal. The new rates in Clinton went into effect on Feb. 20.

Personal Mention

Mr. Seeligsberg, Manager

L. W. Seeligsberg, executive assistant McGraw-Hill Company, has been appointed business manager of the ELECTRIC RAILWAY JOURNAL. In this position he succeeds J. E. Mason, who has been appointed business manager of *Power*, one of the McGraw-Hill publications.

Mr. Seeligsberg, who is a graduate mechanical engineer of Stevens Institute of Technology, and is an associate member of the American Society of Mechanical Engineers, is well acquainted with the electric railway field, having been business manager of this paper in 1918 and 1919. He resigned this office during 1919 to become manager of the circulation department of the McGraw-Hill Company, and later was appointed executive assistant to the president and vice-president of the company.

Mr. Seeligsberg has had an extended experience in the business affairs of technical papers, having been at one time business manager of *Engineering Record* and also for a number of years manager of the service department of the McGraw-Hill Company. He comes to his present position therefore well qualified to carry out its duties.

F. R. Devlin Elected President

Frank R. Devlin has recently been elected president of the State of California Railroad Commission, the position held in past years by the late John M. Eshleman, Max Thelen, now of the Interstate Commerce Commission and E. O. Edgerton. The post has been vacant since Mr. Edgerton's term expired.

Mr. Devlin was appointed to the Railroad Commission by Governor Johnson, taking office January 3, 1915, and filling the vacancy caused when Mr. Eshleman took office as lieutenant governor.

During Mr. Devlin's six years of service on the Railroad Commission he has presided over some of the most important cases in the history of American rate regulation. He has tended to specialize in power and hydro-electric matters, and his decisions in such matters as the Pacific Gas & Electric rate and finance cases laid down the lines upon which will proceed the future power development of California.

Equality of payment among purchasers of service has been one of his outstanding economic policies. In 1918, with Commissioner Edgerton, he sat in the now famous Pacific Gas & Electric surcharge case, out of which developed the decision that corporations must abrogate contracts giving special rates to certain consumers. Many of these contracts were of long standing. Mr. Devlin took the position that to favor one consumer is merely to penalize all the rest, and that contracts of this sort were of the same illegal standing as rebating.

Mr. Devlin is 53 years of age. He resides in Berkeley, Cal.

Mr. Blinn Heads C. E. R. A.

Operating Head of Akron's Railways Foresees Successful Year for Central Association

Alfred C. Blinn, vice-president and general manager of the Northern Ohio Traction & Light Company, Akron, Ohio, was elected president of the Central Electric Railway Association at the annual meeting in Toledo on Feb. 25.

A. C. BLINN

In accepting the office of president of the association, Mr. Blinn expressed pleasure at the opportunity to serve that body. He said it had been his misfortune during the past year, on account of the franchise negotiations and other difficult matters with which his company had been confronted, to be unable to attend the meetings of the association. In listening to the discussion which had taken place earlier in the meeting in regard to the future of the association, Mr. Blinn attributed the apparent lack of interest and enthusiasm in some of the meetings during the last two years to the fact that most of the railway men have been so absorbed in their own company affairs that they have let association matters go.

Looking ahead, Mr. Blinn expressed the hope that an enthusiastic spirit in the association work would prevail this year, for he questioned whether there ever was a time when railway men needed more than now the sympathetic understanding and the personal association which its conferences bring. He declared that while many companies have had their backs to the wall, so to speak, the situation is going to be worked out somehow because the industry had been proved to be essential. "We are selling a service that the public has got to have, and some time the people are going to realize that they must protect the utility companies as well as control them," he said. He hoped to see the electric railways nationalized, in the sense that they would become so stable a business that their securities would be absorbed by the investing public as are government bonds.

Mr. Blinn is a native of Ohio, having been born at Piqua in 1876. His connection with the public utility field began in the electrical department of the Sandusky (Ohio) Gas & Electric Company, of which department he later became superintendent and then general manager of the entire company. In 1904 he went to Macon, Ga., as general manager of the gas light and water company there, remaining for about five years. He was then made vice-president and general manager of the Public Utilities Company, Evansville, Ind. In 1917, following the purchase of the Northern Ohio Traction & Light Company by the Hodenpyl-Hardy interests, Mr. Blinn went to Akron to take the position which he still holds.

New Commissioner in Oklahoma

E. R. Hughes was recently elected a member of the Oklahoma State Corporation Commission. Mr. Hughes was for several years United States Commissioner at Elk City, Okla. He has for years been a close student of conditions in Oklahoma and has shown himself to be a man of courage and sound judgment. As a member of the corporation commission, Mr. Hughes will substantially dignify the administration of that institution, and can be depended upon so to conduct himself that credit will be reflected upon the state.

At a meeting of the members of the commission held recently, Campbell Russell was unanimously elected chairman of the State Corporation Commission, to succeed Art Walker, chairman for the past year and a half.

Motorman Made Labor Head

George B. Arnold, motorman on the Chicago & Oak Park Elevated Railroad, Chicago, was recently appointed chief of the Department of Labor of Illinois by Governor Small. Mr. Arnold has been in the service of the elevated railroads since 1897, and during this long period has endeared himself to his fellow employees as well as to the operating officials by his genial manner and strict attention to duty. For several years he has been prominent in the affairs of the local division of the Amalgamated Association. He has also been a member of the Chicago Board of Education for the past four years. Mr. Arnold was born in Troy, N. Y., in 1866.

Veterans to Operate Toledo Railways

A. Swartz Appointed Vice-President and Superintendent of Transportation—J. M. Enright in Charge of Roadway and Equipment

Two able traction men, Albert Swartz and Joseph M. Enright of the old Toledo Railways & Light Company, will have largely in their hands the operation of the Toledo street railway system under the Milner service-at-cost plan which became effective Feb. 1, 1921. Both are thoroughly acquainted with the problems of city transportation and especially familiar with existing conditions in Toledo. In the Community Traction Company, formed under the new plan to operate the traction properties of the Toledo Railways & Light Company, Mr. Swartz holds the offices of vice-president and superintendent of transportation and Mr. Enright is superintendent of roadway and equipment.

ALBERT SWARTZ is a Toledo boy who started his engineering career in railways back in 1895 when, as a graduate of Toledo Central High School, he took a position as chainman with the Ann Arbor Railroad at Toledo. His engineering work took him from that road to the old Lake Shore & Michigan Southern Railroad, now a part of the New York Central system. A few years later, as construction and maintenance engineer for the Baltimore & Ohio Railroad, he had a large part in the planning of the Washington Terminal. From Washington he went to New York as chief draftsman for the Erie Railroad and later was appointed division engineer at Huntington, Ind.

A. SWARTZ

After these seventeen years of railroad experience Mr. Swartz came to Toledo as an engineer in charge of the maintenance of way of the Toledo Railways & Light Company, and he has been connected directly with Doherty properties in that city ever since. In the fall of 1913 he was made vice-president of the Toledo & Western Railroad and served in that capacity with the interurban line until Jan. 1, 1917, when he came back to the city system as assistant manager of railways and in charge of maintenance and transportation.

Mr. Swartz is 43 years old now and is entering upon his new duties with the same system as vice-president and superintendent of transportation of the Community Traction Company. He has direct charge of operation of the cars and handling all employees in the operating end of the business.

Mr. Swartz belongs to the American Railway Association, the American Electric Railway Association, the American Association of Engineers and the Central Electric Railway Association.

Joseph M. Enright has grown up with the Toledo street railway system. Thirty-three years ago he accepted a position as the driver of a horse-car on the old Erie-Nebraska line and made his start in the business of transporting persons from one part of Toledo to another. Within the first three years of his service on the horse-car lines he became a conductor and then graduated to the motorman's place on one of the first electric cars in Toledo in 1889. He served as barn foreman at the old car barn on Erie Street near Ash Street for two years. Promotion to division superintendent at the powerhouse and barns at Monroe and Water Streets followed and he served in this capacity for eleven years.

In 1902 he went out to Perrysburg for a three-year stay as superintendent of the Maumee, Perrysburg & Waterville line, which is now a part of the Maumee Valley lines. Then he came back to Toledo and became superintendent of transportation of the Toledo Railways & Light Company, and when promoted to manager of railways served in that capacity for ten years. At the end of this term Mr. Enright had been thirty-three years in railway service in this community.

During the formation of the Community Traction Company, to put into operation the Milner service-at-cost plan, Mr. Enright was made temporary president of the company. He is now superintendent of roadways and equipment and has direct charge of maintenance, betterments, the administration of repair shops, carhouses and all equipment of the company.

Outside of electric railways he is most interested in motor boats. He is a member of the Maumee River Yacht Club and the Toledo Yacht Club. He is a member of the Central Electric Railway Association and also of the Toledo chapter of the Doherty Fraternity. Mr. Enright is 53 years old.

E. L. Graumlich has been named engineering assistant to Commissioner Wilfred E. Cann of the Toledo street railway system. He has for two years been in charge of schedules and service in the office of street railway commissioner at Cleveland. Mr. Graumlich was graduated as a civil engineer from the Case School of Applied Science, Cleveland, Ohio, and served through the late war as a second lieutenant in the Coast Artillery Corps. He has had two years' experience with the firm of Barclay, Parsons & Klapp on traffic studies and rapid transit work in Cleveland and vicinity and has had also five years' experience as a traction engineer.

H. Bailey-Stokes has been appointed accounting assistant to Mr. Cann. He is an engineer, a veteran of two wars, and also an expert in street railway accounting. He has been associated for two years with the accounting firm of Price, Waterhouse & Company, Detroit, Mich.

He was born in San Francisco and educated in England as a mining engineer. His first work was in the diamond mines of South Africa. At the outbreak of the Boer War he enlisted and served throughout the war. He returned to San Francisco and engaged in the practice of accounting after the close of the war. He also served in the World War until wounded, then spending the following two years on accounting work for the British government ship repair works in the city of Glasgow, Scotland.

J. M. ENRIGHT

Mr. Goodwin Joins Staff of Electrical Society

William L. Goodwin, well known in the electrical field for his ability to organize and secure co-operation from the various interests engaged in manufacturing and merchandising, has joined the staff of the Society for Electrical Development in the capacity of assistant to the president. Mr. Goodwin and James M. Wakeman, general manager of the society, will direct the activities of the society co-ordinately, under the authority of the president, executive committee and board of directors. Mr. Goodwin was one of the principal speakers at the December meeting of the Central Electric Railway Association in Indianapolis.

Manufactures and the Market

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,
SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES · BUSINESS ANNOUNCEMENTS

Heavy Rolling Stock Loss in Recent Fires

Eighty-Four Cars Burned, with Total Damage of $1,000,000 in First Two Months of Year

With the advent of winter and the additional fire hazards to electric railways entailed thereby an increase in the number of disastrous rolling stock fires may usually be expected. The present year to date apparently presents no exception to this rule. Since the first of the year five fires which caused a loss of $50,000 or more each have been reported in these columns. The entire damage in these instances amounted to almost one million dollars while the number of cars destroyed totaled eighty-four. There were, of course, other fires of lesser importance reported, and undoubtedly some which did not come to the attention of the ELECTRIC RAILWAY JOURNAL. For general purposes, however, these five are sufficient to illustrate the tremendous economic loss which fires cause traction companies and the great need which exists for taking precautionary measures.

All five of the blazes noted occurred in carhouses, and in the three most damaging fires the flames are said to have originated in cars standing in the carhouse. In the other two instances the cause of the fire is unknown. In this connection attention might be called to the ordinance existing in many municipalities that cars must be heated before leaving the carhouse. The frequent practice of leaving cars unattended before they leave the carhouse while the pole is on the trolley wire and the heater and lighting switches are turned on has undoutbedly given many fires their start.

MOST FIRES START IN CARS

In fact, an examination of the fire records of a company which investigates and reports on public utility fires shows that the majority of fires on electric railway properties originate in the rolling stock itself, and with few exceptions the underlying causes are found to be mechanical defects which are encompassed for the most part by defective wiring, overheated resistance, short circuit and broken trolley wire.

During the year 1920 there were approximately twenty-six fires noted in these pages. In four instances the amount of the damage is unknown, but the total loss caused by the twenty-two other fires amounted to $2,225,000. Included in this figure was the value of 313 cars of various types that were entirely destroyed, though it is true that much of the rolling stock burned was old and considerably depreciated in value. Nevertheless, this total, which represents about 9 per cent of all the cars purchased throughout the country last year, represents not only an appalling monetary loss but also a decided setback to service.

Cotton Waste Prices Somewhat Easier

Slightly lower prices are being quoted on cotton waste than were given a month ago. The lowest range on white cotton is around 9 and 10 cents, while the top is from 12½ to 14 cents. For colored cotton waste 7 and 8 cents is given as a low figure and 10 and 11 cents a pound in 100-lb. lots as a top figure. Spot cotton in New York at this writing is 11.20 cents a pound. Buying in the traction field is quiet and in small amounts. With the light demands from railroads and the automotive industry the market shows little activity and supplies are ample to meet quick deliveries. Easing up in freight movement and a car surplus of about 370,000 freight cars is one reason for the curtailed buying. Mill supply of thread waste is beginning to build up.

No Blanket Action Against Price Guaranteeing

The Federal Trade Commission on Feb. 15 announced that it intends no blanket action against the practice of guaranteeing against price decline, but will consider each complaint upon the facts shown in the specific case. Any blanket order would have had considerable effect on many electrical manufacturers. The announcement says:

"The commission received so many complaints about the practice of manufacturers in guaranteeing commodities in the hands of wholesalers against decline in price that an extensive inquiry was made, resulting in expressions from more than 350 manufacturing and selling concerns, including trade associations whose represented membership must be more than double the number of individual statements. From the scope of the inquiry and the number and variety of replies, the result shown must be taken to be fairly representative of the difference in business opinion on this subject.

"The Federal Trade Commission, therefore, will consider each case of complaint of this character upon the facts shown in the specific case, applying the legal tests thereto. This action involves neither approval nor disapproval of the economic soundness of the arguments advanced before the commission for and against this practice."

Unfavorable Outlook fo Early Steel Revival

Demands Necessitated by Wear Tear Alone Only Slightly Unde Present Rate of Mill Operation

Steel and iron, two of the fundame tal factors in this nation's indust were discussed before the editor conference in New York on Feb. by A. I. Findley, editor of *Iron A* In his address Mr. Findley said in pa

"What is certain is that the st trade is today in a depressed state that those who in November looked a moderate revival in the spring 1921 are now setting the date for marked improvement some months f ther on in the year. There is a gro ing belief that present conditions the United States are due more th we were willing to believe last year the financial and industrial straits Europe. As never before leaders industry and finance in this count see that we are linked up with rest of the world for better or wors

STEEL A CRITERION OF BUSINESS

"In view of its basic character velopments in the steel trade are portant as an index to what is to expected in 1921. Today there is abo two-thirds operation of iron and st works, with the possibility that w the coming of spring a temporary sp in demand may bring the percenta up to 75. It has been found in oth times of depression that wear and te alone is good for about a 60 per ce operation in iron and steel.

"The outlook for an early and tensive revival of demand for iron a steel is not favorable. The fall prices of agricultural products, whi already represents a loss of $4,000,00 000 to the farming community, has duced very much the demand for ag cultural improvements. The railroa which in average times take from to 25 per cent of the steel output, buying little. Rails and track acce sories have been in best demand the forms of steel which go to ra roads. Until the railroads are fre from the stranglehold of the wastef labor scheme imposed on them by t government they will not be free bu ers of equipment. Today they ha many idle cars with no early prospe of full use of their equipment.

"That the country is much unde built has been said over and over the past two years. The automob building program for 1921 can hard be more than 40 per cent of that f 1920. The automobile industry h probably not taken more than 5 or per cent of the country's steel outp on the average, but its ramifications into various metal-working and machinery lines are such that it has been a very important sustaining factor. Shipbuilding demand for steel in 1921 is likely to be considerably less than in 1920. Mining, whether of coal, iron or non-ferrous minerals, will be restricted in 1921. So far as iron, copper and other metals are concerned operations of the mines can hardly go beyond 60 or 70 per cent of last year.

"The most favorable indication industrially for the present year is the evidence of a return to economic production methods. It will be a good thing for producers to learn again how to sell their products."

Tie Prices Shaded to Buyer Who Shopped

The course of action of a good-sized Middle Western traction company which was recently in the market for 4,000 railroad ties affords an interesting example of the present tendency of buyers to shop when prices are considered too high. The company in question was quoted a price of $1.60 for the best grade standard white oak ties, delivered. The management deemed this price too high and sent an agent scouting around for a couple of weeks to look over the market. This man came back with the information that ties were plentiful and railroads were not buying to any extent. Furthermore, as a result of his trip a quotation of $1.05 was obtained from a commercial tie producer for the same quality white oak ties, delivered. Second-grade white oak ties were offered at a price of 80 cents each. The company bought 4,000 ties at the latter price and they were shipped immediately from stock.

Trolley Poles Reduced in Price

Two Manufacturers Drop Quotations 20 per Cent—Demand Is Light and Deliveries Are Good

Price reductions on seamless-steel trolley poles have been put into effect by at least two manufacturers recently. The reduction in each case was a general cut of 20 per cent, effective Feb. 23 in one instance and Feb. 26 in the other. Two other manufacturers of trolley poles state that their prices remain unchanged. Steel prices are lower, but the cost of labor is said to be the limiting factor there.

The present market is quiet as buying of this product has been light for some time. It is hoped that following this price decrease and with the approach of spring sales will increase.

Stocks of trolley poles that producers are carrying just now are not large, but deliveries are entirely favorable. One or two manufacturers complain of raw material shipments and state that owing to the continued strong demand for tubular steel products the supply of trolley poles has been somewhat curtailed in the past. This condition is more than balanced, however, by the low volume of orders.

Equipment Manufacturers Unite to Finance Sales

Electric Railway Equipment Securities Corporation has just been formed by the J. G. Brill Company, General Electric Company and Westinghouse Electric & Manufacturing Company, with a capital of $1,000,000. The directors are Samuel M. Curwen, Henry C. Esling, W. H. Huelings, Anson W. Burchard, J. R. Lovejoy, O. D. Young, Guy E. Tripp, H. H. Westinghouse and H. B. Schute.

The activities of the new corporation will be confined strictly to the financing of the sale of street railway equipment, and it is understood its formation does not signify any connection between the three manufacturing companies represented other than providing the means of early payment for their product.

Track and Roadway

Public Utilities Company, Evansville, Ind.—A petition asking that the street car service in Evansville, Ind., be extended through Howell, a suburb, is being circulated by people living in Howell and will be presented to the Evansville Public Utilities Company, operating the car lines in Evansville. It is proposed that the cars run on Broadway and several other streets in Howell. At the present time the cars only run to Barker Avenue and Broadway where they turn. It is the contention of the patrons that the public would receive better service in the event that the lines were extended. Many persons are required to walk fully a mile to their homes after they leave the cars, it is pointed out. Superintendent Gerringher, of the street railway department of the Public Utilities Company, has promised to repair the street between the car tracks on West Franklin Street at Evansville as soon as the weather will permit. The city board of public works has received complaints that the brick paving, especially at crossings, was in bad condition.

Dallas (Tex.) Railway.—Work has been resumed by the Dallas Railway in laying steel on Masten Street which

NEW YORK METAL MARKET PRICES

	Feb. 3, 1921	Mar. 2, 1921
Copper ingots, cents per lb	12.75	12.50
Copper wire base, cents per lb	15.75	15.25
Lead, cents per lb	4.75	4.00
Nickel, cents per lb	43.00	41.00
Zinc, cents per lb	5.50	5.10
Tin, cents per lb	32.25	29.37
Aluminum, 98 to 99 per cent, cents per lb	28.00	28.00

OLD METAL PRICES—NEW YORK

	Feb. 3, 1921	Mar 2, 1921
Heavy copper, cents per lb	11.00 to 11.25	10.25 to 10.50
Light copper, cents per lb	8.50 to 8.75	8.00 to 8.25
Heavy brass, cents per lb	6 00 to 6 50	6.00 to 6.50
Zinc, old scrap, cents per lb	3.00 to 3.25	3.00 to 3.12
Yellow brass, cents per lb	4.00 to 4.50	4.00 to 4.25
Lead, heavy, cents per lb	4.00 to 4.25	3.25 to 3.50
Steel car axles, Chicago, per net ton	16.50 to 17.00	16.50 to 17.00
Old car wheels, Chicago, per gross ton	21.00 to 22.00	18.00 to 18.50
Steel rails (short) Chicago, per gross ton.	16.00 to 17.00	15.50 to 16.00
Steel rails (rerolling), Chicago, gross ton	16.00 to 17.00	15.00 to 15.50
Machine shop turnings, Chicago, net ton.	7.00 to 7.50	6.50 to 7.00

ELECTRIC RAILWAY MATERIAL PRICES

	Feb. 3, 1921	Mar. 2, 1921
Rubber-covered wire base, New York, cents per lb	18.00	16.50
Weatherproof wire base, New York, cents per lb	18.00	17.50
Standard Bessemer Steel Rails, per gross ton	45.00	45.00
Standard open hearth rails, per gross ton	47.00	47.00
T-rail, high (Shanghai), per gross ton, f.o.b. mill	.....	.....
Rails, girder (grooved), per gross ton, f.o.b. mill	.....	.....
Wire nails, Pittsburgh, cents per lb	3.25	3.10 to 3.25
Railroad spikes, drive, Pittsburgh base, cents per lb	3.65 to 4.00	3.65
Tie plates (flat type), cents per lb	2.75	2.75
Tie plates (brace type), cents per lb	2.75	2.75
Tie rods, Pittsburgh base, cents per lb	6.00	6.00
Fish plates, cents per lb	2 75	2.75
Angle bars, cents per lb	2.75	2.75
Rail bolts and nuts, Pittsburgh base, cents per lb	5.50	5.50
Steel bars, Pittsburgh, cents per lb	2.35	2.00 to 2.35
Sheet iron, black (24 gage), Pittsburgh, cents per lb	4.20	3 85 to 4.20
Sheet iron, galvanised (24 gage), Pittsburgh, cents per lb	5.25	4.80 to 5.25
Galvanised barbed wire, Pittsburgh, cents per lb	4.10	3.85 to 4.10

	Feb. 3, 1921	Mar. 2, 1921
Galvanised wire, ordinary, Pittsburgh, cents per lb	3.95	3.70 tc 3.95
Car window glass (single strength), first three brackets, A quality, New York, discount*	77%	77%
Car window glass (single strength), first three brackets, B quality, New York, discount	77%	77%
Car window glass (double strength, all sizes, A quality), New York, discount	79%	79%
Waste, wool, cents per lb	11 to 17	11 to 17
Waste, cotton (100 lb. bale), cents per lb.		
White	10.50 to 14.00	9.00 tc 14.00
Colored	7.50 to 12.00	7.00 to 11.00
Asphalt, hot (150 tons minimum), per ton delivered	40.00	40.00
Asphalt, cold (150 tons minimum, pkgs. weighed in), per ton	36.00	36.00
Asphalt, filler, per ton	36.00	36.00
Cement, New York, per bbl	4.10	4.10
Linseed oil (raw, 5 bbl. lots), New York, per gal	.77	.72 to .73
Linseed oil (boiled, 5 bbl. lots), New York, per gal	.79	.74 to .75
White lead (100 lb. keg), New York, cents per lb	.13	.13
Turpentine (bbl. lots), New York, per gal.	.70	57 to .59

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* These prices are f.o.b. works, with boxing charges extra.

will connect McKinney Avenue with the business district near Ervay and permit the cars now being operated in North Dallas to save fully one mile in making their cross-town trips. Under the present arrangement these cars are routed down McKinney Avenue to Lamar and then traverse the entire business district. Under the new routing made possible by the Masten Street line these cars can be routed into and across the retail district near Ervay. The work of laying steel on Masten has been held up for some weeks on account of paving and other street work, but this has now advanced to a point where the track work can go forward. The work is expected to be completed in sixty days.

Willapa Electric Company, Raymond, Wash.—Public Service Commission of the State of Washington has ordered the Willapa Electric Company to construct and maintain an extension of its railway tracks in South Bend along and on Water Street extended from the present terminus at the west end of Water Street to the office building and store of the Lewis Mills & Timber Company. The decision of the commission was unanimous.

Tacoma Railway & Power Company, Tacoma Wash.—Since the Tacoma Railway & Power Company plans the expenditure of $50,000 to $60,000 during the year in the repair of pavements along its tracks in the city the company has decided to refuse to haul heavy steam railway freight cars on all lines west of Commerce Street.

Brantford (Ont.) Municipal Railway.—The Brantford Municipal Railway expects within the next month to build two miles of track and one mile of overhead work.

Trade Notes

Dwight P. Robinson & Company, Inc., New York City, has recently opened branch offices in Montreal, Canada, in the Dominion Express Building. Alexander C. Barker, vice-president, is in charge of the office.

The Palmer Bee Company, Cameron Avenue and East Grand Boulevard, Detroit, is preparing plans for a four-story factory on Poland Avenue, to cost, including machinery, in excess of $350,000. The company manufactures elevating and conveying machinery.

The Midvale Steel & Ordnance Company, Philadelphia, Pa., earned net profits of $12,371,298 in the year 1920, according to the company's quarterly report. This is equivalent to $6.18 per share, compared with $10,387,418 net profits or $5.19 per share in 1919.

William C. Wilson, formerly with Taylor-Wharton Iron & Steel Company and William Wharton, Jr., Company as manager of sales, northeastern territory, has become associated with the Pittsburgh Screw & Bolt Company and will be located at its New York office, 50 East Forty-second Street.

The Clifton Manufacturing Company, Boston, has moved into offices in the new addition recently made to its plant at 63 Brookside Avenue. The portion of the old building made vacant by this change will be used for factory purposes. The company manufactures enamel and galvanized-steel conduits, insulating tapes and compounds and specialized rubber goods.

The Conveyors Corporation of America, Chicago, announces that S. D. Inman has been placed in charge of the engineering and design of its American trolley carrier and monorail conveying equipment for handling coal, ashes, sand, gravel, etc. Mr. Inman has been associated with the company in an engineering capacity for over a year.

The Tubular Woven Fabric Company, Pawtucket, R. I., has removed its New York office from 61 Broadway to 52 Vanderbilt Avenue. This change was made necessary because of the sale of "Duraduct" and "Duracord" having been combined under one sales organization. P. S. Klees has been engaged to take care of the combined sales in that territory.

George J. Blanton, who for the past four years has been connected with the engineering sales department of Chain Belt Company, Milwaukee, has been made New York district manager. Mr. Blanton has figured prominently in the largest installation of traveling water screens yet on record. Before joining the company he was with the General Electric Company for eight years. He is a graduate of the University of Michigan department of mechanical and electrical engineering class of 1909.

The Concrete Mixer Association of the United States, at its annual election of officers, held in Chicago, Jan. 28, elected Clifford F. Messinger of the Chain Belt Company, Milwaukee, president; W. B. Knickerbocker of the Knickerbocker Company, Jackson, Mich., was elected vice-president; A. T. Scannell of the Archer Iron Works, Chicago, Ill., treasurer, and H. E. Smith, president of the T. L. Smith Company, Milwaukee, Wis., chairman of the executive committee.

Peru Invites Exhibits of American Manufacturers at Centennial. — The Peruvian government will this year celebrate the centennial of its independence and has voted a sum equivalent to about $3,000,000 for this purpose. According to the Consul-General of Peru at New York, it has been arranged to hold an exhibit, probably in Lima, of manufactures of other countries. Concessions have been granted to the Peruvian Centennial Exhibits Company, 42 Broadway, New York City, and A. Ameraldi, Lima, Peru, from whom information as to allocations of space and rental charges can be obtained.

The Toledo Crane Company, Bucyrus, Ohio, successor to the Toledo Bridge & Crane Company, Toledo, manufacturer of "Toledo Cranes," has been chartered under the laws of Ohio. The company is now constructing and expects to have completed by March 15 a building, 120 ft. x 320 ft., to be used for erecting and assembly purposes; machine shop, 60 ft. x 300 ft.; structural shop, 90 ft. x 300 ft.; pattern shop, 60 ft. x 140 ft., all equipped with modern tools and arranged for continuous production, which will enable it to maintain former standards of quality and service established for "Toledo" cranes. The main office of the company will be at Bucyrus, with sales offices in New York City, Boston, Philadelphia, Pittsburgh, Buffalo, Cleveland, Cincinnati, Chicago, St. Louis, Kansas City, Seattle, Salt Lake City, San Francisco, Birmingham and Minneapolis. C. F. Michael is president and W. F. Billingsley is vice-president and general manager.

New Advertising Literature

Separators. — The Griscom-Russell Company, 90 West Street, New York City, is distributing a form sheet describing the new Stratton separator for power plants.

Angle Fittings, Water Heaters and Rotometers.—The American District Steam Company, North Tonawanda, N. Y., has issued bulletins Nos. 151, 152 and 153, describing its "Adsco Rotometer," "Adsco" water heaters and "Adsco" angle fittings, respectively.

Catalog.—The Ohio Brass Company, Mansfield, Ohio, has just issued catalog No. 18 for 1921, a 638-page illustrated volume covering the company's line of high-tension insulators, trolley line materials, rail bonds and tools, third rail insulators and equipment specialties.

Insulation Testing Sets.—James G. Biddle, Philadelphia, is distributing a folder on "Megger Testing Sets" for measuring the insulation resistance of wires, cables, generators, motors, transformers, switchboards, insulators, etc.

Engineering.—"Achievement" is the title of a folder being distributed by the J. G. White Engineering Corporation, New York City, dealing with the power and hydro-electric developments, transmission systems and other engineering projects of the company in this and in foreign countries.

Flooring and Steps.—Irving Iron Works Company, Long Island City, N. Y., has issued a seventy-two-page booklet-catalog with illustrations and descriptions of typical installations of "Irving Subway" ventilating flooring and "Irving Safstep" non-slipping steps.

Boiler Room Manual.—H. S. B. W.-Cochrane Corporation, manufacturer of boiler room equipment, has published a second revised edition of its 414-page manual entitled "Finding and Stopping Waste in Modern Boiler Rooms."

Switches for Battery Charging.—The Automatic Electrical Devices Company, 122 West Third Street, Cincinnati, has placed on the market a heavy duty self-closing underload switch (type M), with ratings of 50 amp. to 200 amp., designed for charging large storage-battery mining locomotives.

Peacock Staffless Brake

"The Peacock Staffless"

THE skidding, back-sliding truck has no terrors for the motorman whose Safety Car is equipped with the Peacock Staffless. He *knows* he can unfailingly bring his car to a sure stop, either QUICK or GRADUATED. He knows that he needs not face an accident if "caught" with air at low pressure.

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— for —
BUTT-TREATING CEDAR POLES
P & H Guaranteed Penetration Process

HEIGHT OF TREATMENT

The butts of all poles shall be treated to the height as set forth in the table below.

PENETRATION RESULT

The sapwood of each and every pole shall be impregnated with the preservative to a depth of one-half inch in every portion of the pole in that area between the plane designated as the height of treatment as set forth in the table below, to a plane one and one-half feet below the standard ground line, unless the sapwood be less than one-half inch in thickness, in which case the impregnation will be to the full depth of the sapwood throughout this area.

PENETRATION TEST

The result shall be determined by making frequent tests with an increment borer, removing thereby a plug taken from this area at a point one foot below the standard ground line. The hole from which this plug is removed will then be sealed with Creosote, after which a creosoted plug will be tightly driven in.

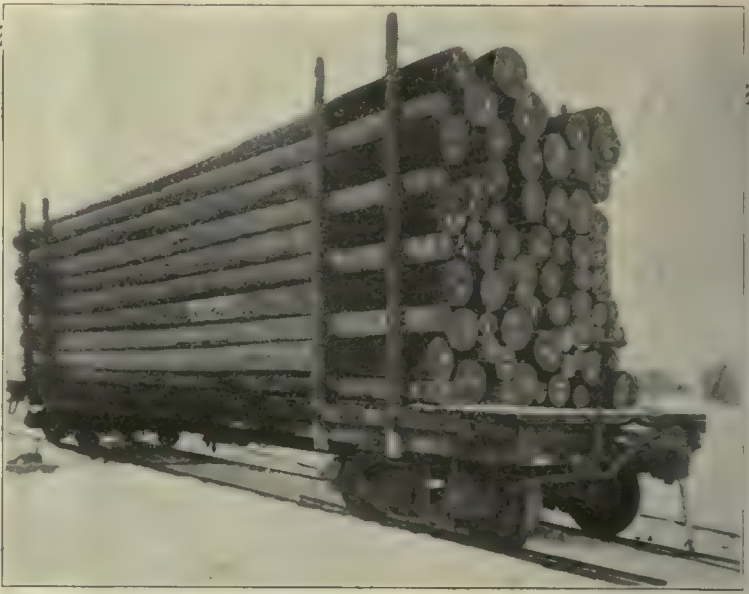
PRESERVATIVE

The preservative shall be a pure coal-tar distillate obtained entirely from coal gas or coke-oven tar and must not contain any admixture of any other tar oil or residue obtained from petroleum or any other source, including coal-gas or coke-oven tar and must conform to the standard specification of the American Wood Preservers Association, and the American Railway Engineers Association for Creosote Oil, and the National Electric Light Association's "A" Specifications covering coal-tar creosote.

Length of Poles	Standard Ground Line	Height of Treatment
16 feet	4 feet	5 feet
18 ”	4 ”	5 ”
20 ”	4 ”	5½ ”
22 ”	4½ ”	6 ”
25 ”	5 ”	6 ”
30 ”	5½ ”	6½ ”
35 ”	6 ”	7 ”
40 ”	6 ”	7 ”
45 ”	6½ ”	7½ ”
50 ”	7 ”	8 ”
55 ”	7½ ”	8½ ”
60 ”	8 ”	9 ”
65 ”	8 ”	9½ ”
70 ”	8 ”	10 ”
75 ”	8 ”	10 ”
80 ”	8 ”	10 ”

Butt-Treated
BY
PAGE & HILL Co.
1921
GUARANTEED
One-Half Inch
PENETRATION

This disc countersunk on the butt-end of every pole Butt-Treated by the P & H Guaranteed Penetration Process is your assurance of one-half inch penetration.



Load of poles Butt-Treated by P & H Guaranteed Penetration Process, ordered by the Des Moines City Railway Company.

More Value In Every Way

THAT'S what the Page & Hill Guaranteed Penetration Process means to pole users.

P & H Merit and P & H Guarantee backs up every pole treated by this — the original guaranteed penetration process.

Big pole buyers have quickly recognized the value of the original guaranteed penetration process.

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Agreements are Withstanding the Assault of Higher Costs

You know that even the cheap paper that goes into the making of your transfers is no longer cheap; and you know that 1-cent newspapers are now selling for 3 cents and more.

Conceive our difficulties, then, in securing and paying for the high-grade stock and inks that are indispensable to Collier Service Car Cards; and of the higher mechanical and labor costs generally.

But, in spite of all these increases, the Collier contracts made with you in days of low price operating cost are being fulfilled.

When you sign a Collier contract you know that it will be made good to the end of the term regardless of fluctuations in our business or in yours.

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INCORPORATED

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Safety car operation in Springfield, Mass., with Miller Trolley Shoes.

"There was far less arcing with the sliding shoe than with the wheel trolleys."

Thus reads a conclusion of a test made by an authority on a number of different trolley wheels and on Miller shoes.

It is just such conclusions as these that are continually winning many safety car operators over to the Miller Trolley Shoe.

If you'll make your slogan "Miller Shoes for Safety Cars or any other type" then you'll soon begin to reap the benefits, which are:

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3. **No limitation on use of steel or composition wire.**
4. **No broken trolley poles.**
5. **No traffic interruptions because of dewirements.**

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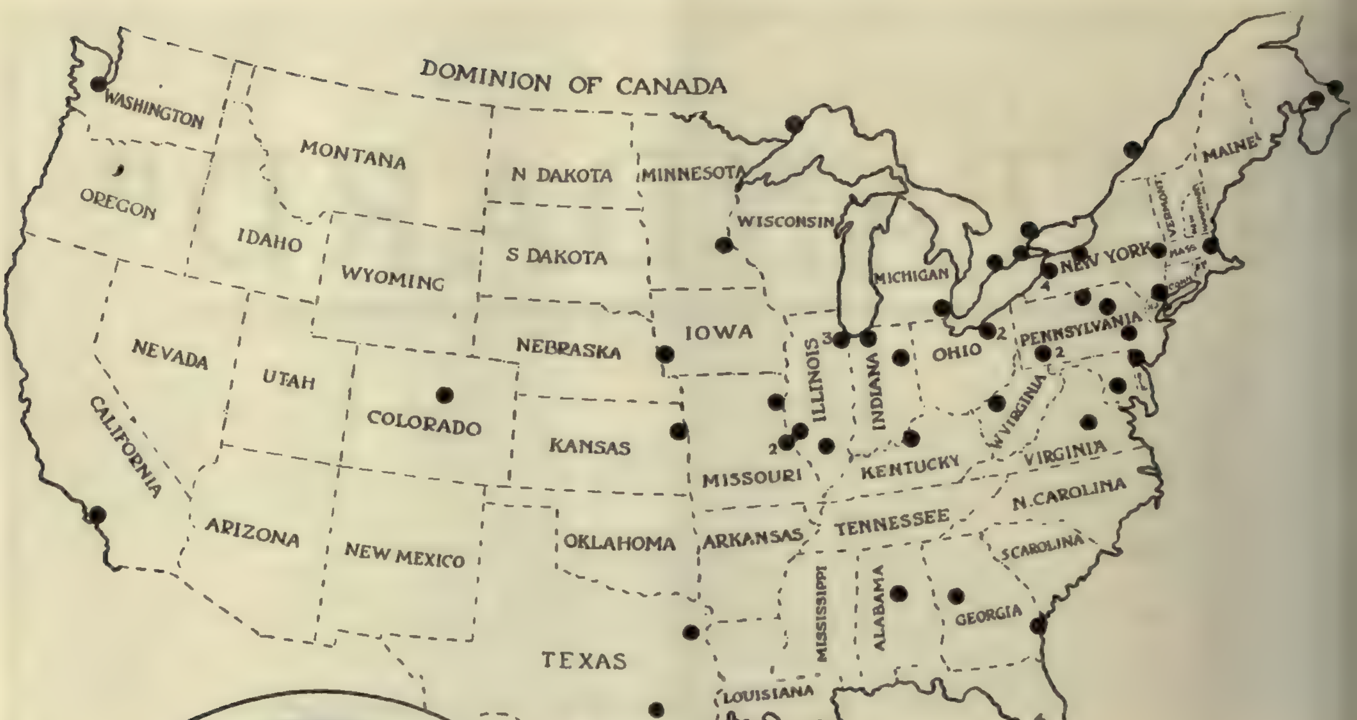

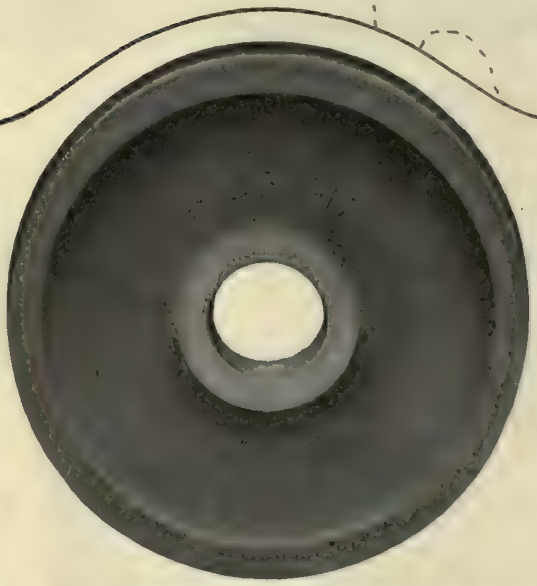

49 *The map above shows the location of the 49 foundries in the United States and Canada, represented by the Association of Manufacturers of Chilled Car Wheels*

Chicago 3
St Louis 2
Buffalo 4
Pittsburg 2
Cleveland 2
Amherst N.S.
Montreal
Mich. City, Ind
Louisville
Mt Vernon, Ill
Ft. Wayne, Ind
Birmingham
Atlanta
Savannah

Boston
Detroit
St. Paul
Kansas City, Kan
Denver
Tacoma
Rochester, N.Y.
Sayre, Pa
Berwick, Pa.
Albany
Toronto
New Glasgow N.S
Madison, Ill.

Huntingdon W Va
Wilmington, Del
Houston, Tex
Hannibal Mo
Reading, Pa
Baltimore
Richmond, Va
Ft. William, Ont
St. Thomas, -
Hamilton,
Ramapo, N.Y
Marshall, Tex
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650 lb. wheel for 60,000 Capacity Cars
700 lb. wheel for 80,000 Capacity Cars
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The Standard Wheel for Seventy Years

Where CHILLED IRON WHEELS *are made for Railway and Street Car Service*

Capacity 20,000 per day
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U-RE-LITE

A modern Circuit Breaker to meet modern conditions. An I-T-E Circuit Breaker in a steel box: so much better than a fused switch that it is in a class by itself.

It opens instantly on the occurrence of a short circuit or a predetermined overload and can be as instantly reset, but it cannot be closed if the overload continues on the line.

IT DOES AWAY WITH THE CONSTANT EXPENSE AND THE DAMNABLE ANNOYANCE DUE TO THE USE OF FUSES, FOR THE CRY "FUSE BLOWN" MEANS IDLE MEN. It greatly diminishes the possibility of fire from electrical causes and affords positive protection to employees as well as to light or power circuits.

Made in capacities of 60 amperes and under for D.C. circuits of 250 volts or less and A.C. circuits of 250 volts or less, single phase.

Each pole is closed by a slight turn of the handle, which is seen projecting above and below the tripping knob, by means of which the U-RE-LITE may be opened manually.

First to the left,
Then to the right,
Turn the handle
And U-RE-LITE.

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PHILADELPHIA

Bates One-Piece Steel Poles in Lapland, Sweden

These Extended Steel Poles are being used by the Royal Swedish State Railways to give permanent construction in Lapland, Sweden—75 miles north of the arctic circle. Climatic conditions are extremely severe in this wind swept arctic solitude Patroling this line is impossible at times, replacements are prohibitive—the construction just had to be permanent and reliable as well as economical, so Bates Poles were chosen.

The engineers of the Swedish government who made this installation have recommended and specified Bates Poles many times since then and we ship them thousands of poles yearly. This installation demonstrated beyond any doubt that Bates One-Piece Steel Poles are dependable, permanent and decidedly economical.

Your construction is permanent when you use Bates One-Piece Steel Poles. Their economical tested strength gives unfailing service.

Our New 1921 TREATISE AND HANDBOOK sent upon request.

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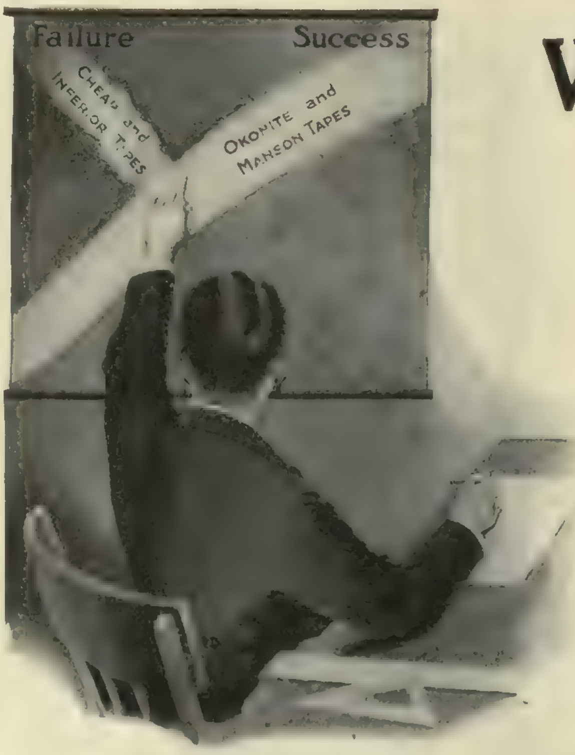

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Mr. Engineer?

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Are you courting failure by the use of cheap splicing tapes—tapes that contribute *weakness* instead of *strength* to this small but *vital* part of the distribution system? OR are you insuring Success by the use of Okonite and Manson Tapes?

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Splices made by using Okonite Rubber Insulating Tape and Manson Friction Tape will put you on the right road—*and keep you there.*

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TRADE MARK

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and successfully cut maintenance costs if you turn to

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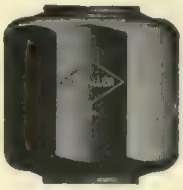
of strain insulators, hangers, splicing ears, crossings, and other overhead material.

They are "specialty" products, designed and built to make "Macallen" the standard on American railways.

It will pay you to write for information and prices.



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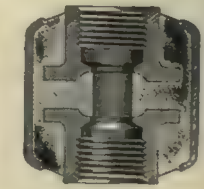

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TRADE MACALLEN MARK.

The Macallen Company
Macallen and Foundry Sts., Boston

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It Bends to the Right or the Left

The Reading Reversible Bender enables you to make your own guard rails. It is a real economy for it does the work of any two benders, bending rails nine inches from the end—*either to the right or the left*—without applying splice bars and additional rail.

Trunnion construction in screw eliminates bending strain and allows screw to remain at right angles with rail. Trunnion bushings of special bronze reduce friction to a minimum.

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Anderson Wood Strain Insulators

They can tighten slack guy wires a great deal easier and quicker with these insulators, on account of the Double Take Up feature.

"The old man" likes them for these same reasons and also another, namely this: They do away with the common practice of twisting the slack taut, a practice that impairs the life of the wire.

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Riveted **CULVERTS**

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Made in all the standard diameters. Our strong end reinforcement is furnished with those of 24 in. in diameter or under. Write for delivered prices.

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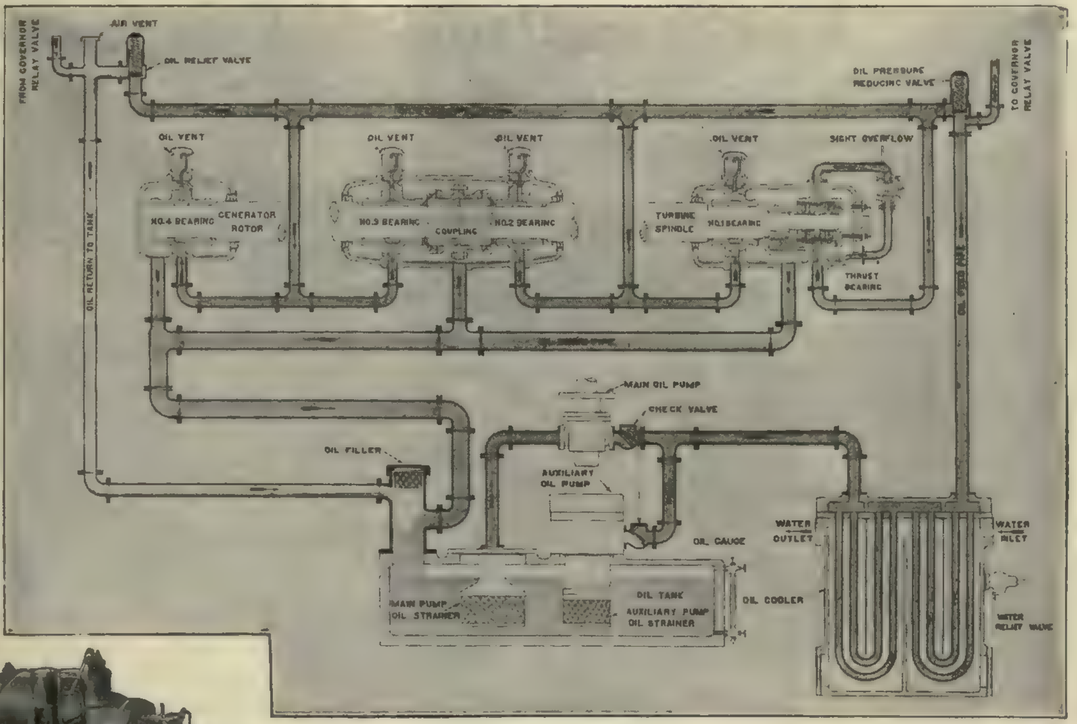

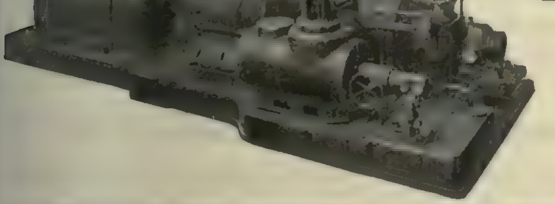

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Keep Your Cars in Service By Means of

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As soon as a truck frame of a motor case breaks it can be quickly Thermit welded in a few hours and the car will be out on the road doing business again. Our useful and inexpensive Thermit Welding equipments will pay for themselves many times over by avoiding the necessity for purchasing new equipment and the much greater cost of idle cars.

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Van Dorn
No. 880 M. C. B. Coupler
Equipped with No. 100 Swivel Draft Gear

Interchanges with all standard M.C.B. Couplers on both steam and electric railroads

Important Features:

Couples Automatically by impact. Uncouples from outside of car.

Extended Guard Arm and Butting Wall make coupling positive and certain, even when couplers are greatly out of line.

Deep, slotted Knuckle permits wide free vertical movement.

Absorbing Springs at front and rear of Swivel-Anchor of Draft Gear insure that all stresses applied to Coupler Head are absorbed direct at every position of radial movement (120 degrees), as these Springs travel in line with Head.

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Interchanges with all standard M. C. B. Couplers on both steam and electric railroads.

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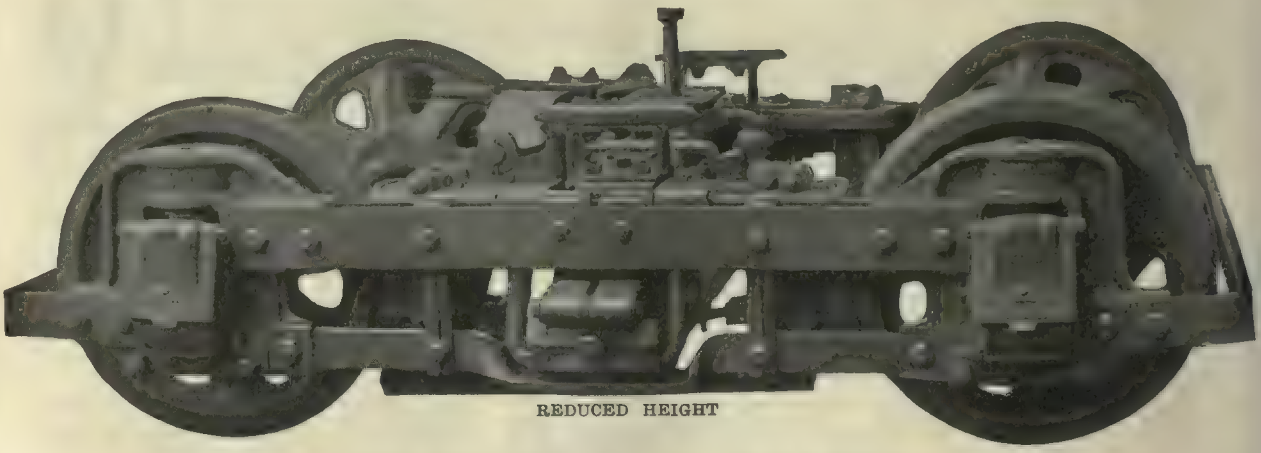

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Mounted on 26-in. Wheels with Springs Over Journal Boxes.
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Wheel Base 5 ft. 2 in. For Car Bodies weighing 16,000 to 22,000 lb. Motors Inside Hung.

EASY RIDING

Journals 3¾ x 7 M. C. B. Type. Height from Rail to Body Bolster, 22¾ in. Brakes Inside Hung.

TAYLOR ELECTRIC TRUCK CO., TROY, N.Y.

SPECIFICATIONS ON REQUEST
Established 1892
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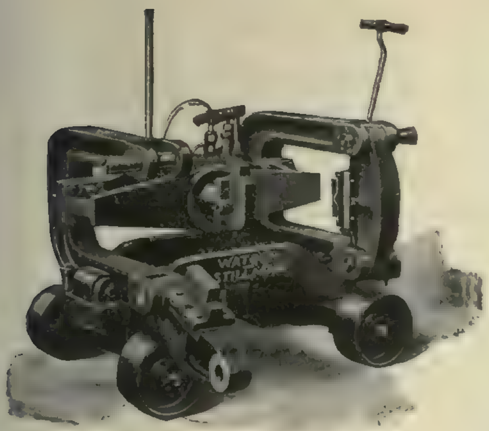
You Can Bend Rails Quickly and Economically With a Watson-Stillman Hydraulic Rail Bender



Hydraulic Portable Rail Bender

The portable rail bender shown herewith is designed for use on the road. It is equipped with interchangeable formed bending blocks, and will make any bend without buckling. The hinged yoke permits the rails to be put in sidewise. It can also be used for other heavy bending.

We build many other handy tools for the railway shop. Such as: Crank Pin Presses, Wheel Presses, Forcing Presses, Forging Presses, Jacks, Pit Jacks, Punches, Shears, Pumps, Accumulators, etc.

Write for Catalogs.

The Watson-Stillman Co., 46 Church St., New York

Chicago: McCormick Building **Philadelphia: Widener Building**

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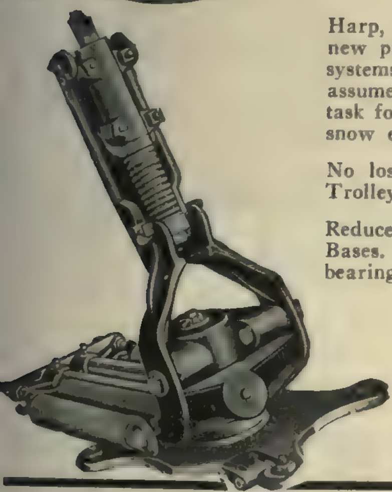
30 Seconds

Let the motorman do it while waiting for passengers

10 Seconds



Harp, wheel or sleet cutter changed in ten seconds or a new pole in 30 seconds. No tools required. On large systems where the exchanging of sleet cutters for wheels assumes enormous proportions and come as an additional task for the shop forces when they are usually busy with snow equipment, let the motorman make the change.

No loss of time if you have standardized on Bayonet Trolley Equipment.

Reduce trolley jumping to a minimum with Bayonet Bases. Perfect alignment of wheel. Sensitive roller bearings.

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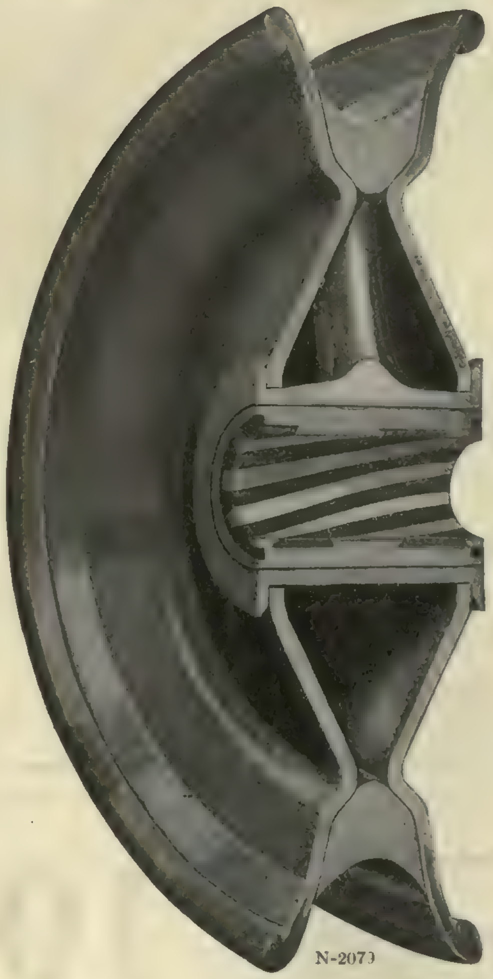

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This is the natural demand that every railway operating man makes when selecting trolley wheels, because railways to be run at all, must be run economically.

Steel protects and insures life, and bronze is the reliable current collector in the IDEAL TROLLEY WHEEL.

It is a trolley wheel built scientifically to fill a need.

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says
'I sold my services
on guaranteed efficiency.
The chief has never
regretted it."

This Is Yours-Write For It

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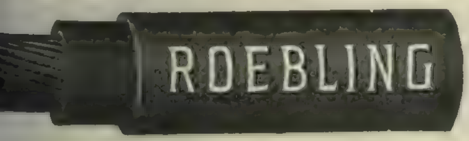

Wire Rope
and Wire
Electrical
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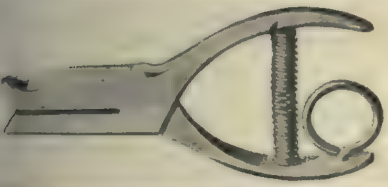

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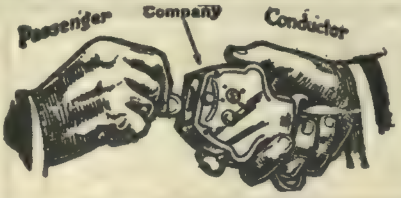

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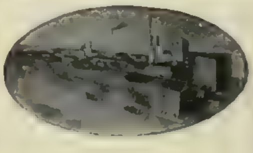

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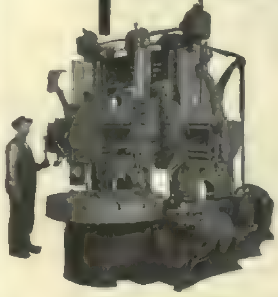

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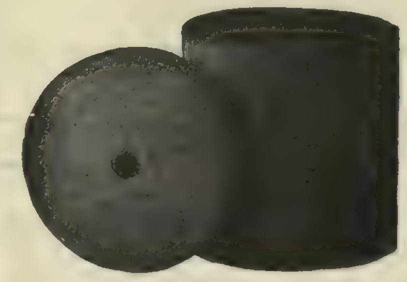

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WATER
PURIFICATION SYSTEMS
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FOR BOILER FEED AND
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"HONEYCOMB" AND "ROUND JET" VENTILATORS
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of Car Temperatures.

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Bemis Trucks
Case Hardened Brake Pins
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Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

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Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.
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EMPLOYMENT

POSITIONS WANTED

POSITIONS VACANT

CARPENTER foreman and blacksmith foreman wanted by large electric railway company in Middle West. State experience and references and advise salary required. P-849, Elec. Ry. Journal, Old Colony Bldg., Chicago.

WE have an opening in our organization for a competent public utility accountant. One having experience in light, gas and street railway accounting preferred. P-843, Elec. Ry. Journal, Old Colony Bldg., Chicago.

POSITIONS WANTED

EXPERIENCED outside construction man desires position in way of electric railway, lighting, underground and submarine cables. Most experience in city of 200,000 population. Can produce results. PW-828, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

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SUPERINTENDENT of transportation desires making a change, will consider any city or suburban property that requires a man of broad experience; age 40, clean and progressive; nearly 18 years' experience on large city and suburban properties; successful in dealing with public and labor, having a proven record as a transportation man who knows how to get results and build up; best of references. PW-854, Elec. Ry. Journal, Old Colony Bldg., Chicago.

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YOUNG man, experienced as inspector, dispatcher, time tables and chief clerk in transportation department, now employed, desires change with chances for advancement. Prefer Middle West or South. PW-845, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

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10 shares Co-operative Society of America, $350; 10 Elgin Motor Co., $70. Phone Englewood 187, L. J. Mather, 6807 Union Ave., Chicago, Ill.

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Prices on 2—B. & W. Water Tube Boilers 520 Horse Power, 18 Tubes wide, 14 Tubes high, 200 lb. pressure, or Edgemoor Boilers about 510 Horse Power, 17 Tubes wide, 15 Tubes high, both with 125 degree Superheaters and Underfeed Stokers. All of above must be in first-class condition.

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Buyers

Everywhere

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Try an ad for what you wish to sell.

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100 Westinghouse 56

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Complete. Just taken out of service.

Philadelphia Rapid Transit Company
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820 Dauphin Street, Philadelphia, Pa.

COMPLETE POWER PLANT

FOR SALE

1—500 h.p. Westinghouse Compound Engine, Direct Connected to 550 volt Generator.

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1—B & W Boiler, 2 Keeler Boilers, Water Heaters, Pumps, Piping, Switchboards and etc.

All in first class operating condition. Immediate delivery. Make us an offer.

The Lewistown & Reedsville Electric Railway Co., Lewistown, Pa.

NEW—80-LB. RAIL and ACCESSORIES

Angle Bars, Spikes, Bolts and Nuts Complete

FOR SALE

A.R.A. "TYPE B" RAIL

Approximately 30,000 gross tons—standard lengths

Stored at Kearney, New Jersey

We buy electric and steam railways that are to be dismantled

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Manufacturers who accept used machinery in part payment for new can dispose of it promptly by advertising in the Searchlight Section.

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The cost of putting your Wants in this projector is very slight, whether for a man, for a job or for a market.

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One combination electric weld and copper weld rail

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Complete with cast weld outfit for 550-600 volts. Bonding car equipped with West. equipment, and is in A1 condition. Sold subject to agreement with Electric Improvement Company. Your best bid solicited.

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75 hp. Westgh. 550/600 Volt Direct Current Motor; Form 12, Type S; Direct Coupled to 50 kw. Direct Current Booster, 250/182 Volts; 400/200 Amps, 950 r.p.m.; Set is 2 Bearings; Both machines mounted on same iron base and are practically new.

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first-class condition. Car type 1200-600 V. 15 Amps.

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New—Used—Rebuilt

MACHINERY AND SUPPLIES
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An Unusual Opportunity

Large Stock of New Repair Parts Consisting of

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Now is the time for you to stock up for emergency at attractive prices. Write, phone or wire for what you need.

Eastern Massachusetts Street Ry. Co.
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ELECTRIC MOTORS

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NEW A.C. MOTORS ½ to 15 H.P.—LARGE STOCK USED MOTORS
EXCELLENT REPAIR SERVICE ON ANY SIZE OR TYPE

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Machinery in Stock *for* *Immediate Shipment*

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2—150 kw. G. E. 25 cy., 370 v. A.C.; 600 v. D.C., 750 r.p.m.

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1—500 kw. G. E. 3 ph., 60 cy., 2300 v., 750 r.p.m. generator dir. ctd. to 700 hp., 3 ph., 25 cy., 13200 v., 750 r.p.m. motor.
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Some One Wants to Buy

the equipment or machinery that you are not now using.

This may be occupying valuable space, collecting dust, rust and hard knocks in your shops and yards.

Sell it *Before* depreciation *Scraps* it.

0178

IF YOU CAN'T USE IT

Sell It

The equipment you do not need can usually render good service elsewhere. You can reach the largest group of buyers of such equipment at small cost through an ad in the

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For Every Business Want
"Think* SEARCHLIGHT *First"

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The

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March 19, 1921

Have you arranged
for space and copy?

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Acetylene Service & Apparatus
Oxweld Acetylene Co.

Advertising, Street Car
Collier, Inc., Barron G.

Air Receivers
Ingersoll-Rand Co.

Air Aftercoolers
Ingersoll-Rand Co.

Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Angle Bars
Lackawanna Steel Co.

Automobile and Buses
Brill Co., The J. G.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Standard Steel Works Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Babbitt Metal
Ajax Metal Co.
More-Jones B. & M. Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

Bankers & Brokers
Coal & Iron National Bank

Batteries, Dry
Nichols-Lintern Co.

Bearings, Roller and Ball
Railway Roller Bearing Co.

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Benders, Rail
American Chain Co., Inc.
Niles-Bement-Pond Co.
Watson-Stillman Co.
Zelnicker, Walter A., Supply Co Inc.

Boilers
Babcock & Wilcox Co.

Boiler Tubes
National Tube Co.

Bond Testers
American Steel & Wire Co.
Rail Welding & Bonding Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.
Oxweld Acetylene Co.
Rail Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse Elec. & M. Co.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Boxes—Junction and Outlet
National Metal Molding Co.

Brackets and Cross Arms. (See also
American Bridge Co.
Bates Expanded Steel Truss Co.
Creaghead Eng. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Poles, Ties, Posts, Etc.)
Ohio Brass Co.

Brake Adjusters
National Railway Appliance Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.

Brakes, Brake Systems and Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Taylor Electric Truck Co.
Westinghouse Traction Brake Co.

Bridges & Buildings
American Bridge Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Westinghouse Elec. & M. Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Bunkers, Coal
American Bridge Co.

Bushings, Case Hardened & Manganese
Bemis Car Truck Co.
Brill Co., J. G.
National Metal Molding Co.

Bushings, Graphite & Wooden
Bound Brook Oilless Bearing Co.

Cables. (See Wires and Cables)

Carbon Brushes. (See Brushes, Carbon)

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Railway Appliance Co.
Thomas, Perley A.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Car, Self-Propelled
General Electric Co.

Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Castings, Funnel
Wharton, Jr. & Co., Inc., Wm.

Castings, Gray Iron and Steel
American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
Wharton, Jr. & Co., Inc., Wm.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.

Catchers and Retrievers. Trolley
Earll, C. I.
Electric Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Change Carriers
Galef, J. L.

Circuit Breakers
Condit Electrical Mfg. Co.
Cutter Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers Track—(See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.

Cleats
National Metal Molding Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling—(See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines
Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Trac. B. Co

Compressors, Gas
Ingersoll-Rand Co.

Condensers
General Electric Co.
Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

Conduit Fittings
Chicago Fuse Mfg. Co.
National Metal Molding Co.

Conduits, Underground
Standard Underground Cable Co.

Connectors, Solderless
Westinghouse Elec. & Mfg. Co.

Controller Fingers
Russell Mfg. Co.

Controllers or Parts
Columbia M. W. & M. I. Co.
General Electric Co.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Controller Regulators
Electric Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Converters, Rotary
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Conveying and Hoisting Machiner
American Bridge Co.
Columbia M. W. & M. I. Co.

Copper Wire
Anaconda Copper Mining Co.
Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roeblings Sons Co., John A.
Samson Cordage Works

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Trac. B. Co.

Cranes
Niles-Bement-Pond Co.
Toledo Bridge & Crane Co., Th

Cresote
Barrett Co., The

Cresoting
Barrett Co., The

Cross Arms. (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossings, Frogs and Switches
Wharton, Jr. & Co., Inc., Wm

Crossings, Manganese
Indianapolis Switch & Frog Co.

Crossing Signals. (See Signals, Crossing)

Crossings, Track. (See Track, Special Work)

Culverts
Canton Culvert & Silo Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Electric Service Supplies Co

Cutouts
Chicago Fuse Mfg. Co.

Cutting Apparatus, Oxy-Acetylene
Oxweld Acetylene Co.

Dealers' Machinery
Archer & Baldwin
Cleveland Armature Wks.
Electric Equipment Co.
Foster Co., L. B.
Griswold Machine Co., Geo. M
Hyman Michaels Co.
Zelnicker Supply Co., Inc., Walter A.

Derailing Devices. (See also Trac Work)
Cleveland Frog & Crossing Co

Destination Signs
Columbia M. W. & M. I. Co.
Creaghead Eng. Co.
Electric Service Supplies Co

Detective Service
Wish Service, P. Edward

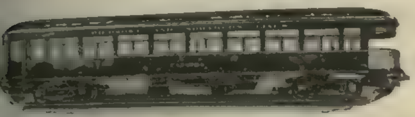
Dogs, Lathe
Williams & Co., J. H.

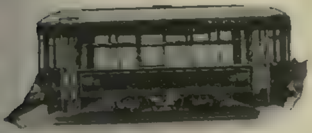
Door Operating Devices
Consolidated Car Heating Co
National Pneumatic Co., Inc.
Safety Car Devices Co.

Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc

Draft Rigging. (See Couplers)





PERLEY A. THOMAS CAR WORKS

Manufacturer of Cars
and Car Materials

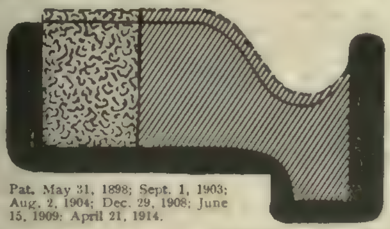
Cars of all types from one-man to large interurban

HIGH POINT, N. C.

ASHES, DOORS
NTERIOR FINISH
ESTIBULES AND FRAMING

CURTAINS, VENTILATORS
SASH AND DOOR TRIMMINGS
DOOR AND STEP MECHANISM

Wheel Condition No. 6



Pat. May 31, 1898; Sept. 1, 1903; Aug. 2, 1904; Dec. 29, 1908; June 15, 1909; April 21, 1914.

When only the outer part of tread needs grinding this arrangement of abrasive and non-abrasive material in the Wheel Truing Brake Shoe will correct matters—and without the car losing a minute's service.

Wheel Truing Brake Shoe Co.
Detroit Michigan

B. A. Hegeman, Jr., President; Charles C. Castle, First Vice-President; Harold A. Hegeman, Vice-President and Treasurer; Fred C. J. Dell, Secretary; W. C. Lincoln, Manager Sales and Engineering.

National Railway Appliance Co.

50 East 42nd St., NEW YORK CITY
Hegeman-Castle Corporation, 343 So. Dearborn St., Chicago, Ill.
National Railway Appliance Co., Munsey Bldg., Washington, D. C.
National Railway Appliance Co., Little Bldg., Boston, Mass.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions, Anderson Slack Adjusters, Genesco Paint Oils, Dunham Hopper Door Device, Feasible Drop Brake Staffs, Anglo-American Varnishes, Paints, Enamels, Surfaces, Shop Cleaner, Johnson Fare Boxes, Drew Line Material and Railway Specialties, Perry Side Bearings, Miller Trolley Shoes, Hartman Centering Center Plates, Economy Power Saving Meters, H. and W. Electric Heaters, Garland Ventilators, Pitt Sanders, National Safety Car Equipment Co.'s One-Man Safety Cars, Flaxlinum Insulation.

WE CAN CUT YOUR COST OF HEATING CURRENT

Write for THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.
VENTILATORS Also Ventilate in Stormy Weather.
THERMOSTATS Save Current.
ORIGINATED the use of NON-CORROSIVE Wire for Electric Car Heaters.
ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS
Gold Car Heating & Lighting Co., 17 Battery Pl., New York

THE COAL & IRON NATIONAL BANK of the City of New York

Capital $1,500,000
Surplus $1,000,000 Und. Profits $363,051
Resources $23,743,000

Offers to dealers every facility of a New York Clearing House Bank.

Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost

The Cooper Heater Company
Carlisle, Pa.

See the Crank of the

CREAGHEAD DESTINATION SIGN

By means of it, conductor or motorman can change sign without leaving platform. All that has to be done is to turn the crank. Better investigate.

CREAGHEAD ENGINEERING CO., CINCINNATI, O.

FLOOD CITY

Rail Bonds and Trolley Line Specialties

Flood City Mfg. Co., Johnstown, Pa.

STUCKI SIDE BEARINGS

A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

WHAT AND WHERE TO BUY

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co
Niles-Bement-Pond Co.
Ohio Brass Co.

Dryers, Sand
Electric Service Supplies Co.
Zelnicker Supply Co., Walter A., Inc.

Electrical Protective Devices
Condit Electrical Mfg. Co.

Electrical Wires and Cables
Roebling's Sons Co., J. A.

Electrodes, Carbon
Indianapolis Switch & Frog Co.

Electrodes, Steel
Indianapolis Switch & Frog Co.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. E.
Archbold-Brady Co.
Arnold Co., The
Clark Management Corp., E. W.
Day & Zimmermann, Inc.
Drum & Co., A. L.
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Englehardt W
Horton, Barker & Wheeler
Jackson, Walter
Jacobs & Co., J. L.
Parsons, Klapp, Brinkerhoff & Douglas
Republic Engineers, Inc.
Richey, Albert S.
Sanderson & Porter
Sargent & Lundy
Scofield Engineering Co.
Stone & Webster

Engines, Gas, Oil and Steam
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

Expansion Joints, Track
Wharton, Jr. & Co., Inc., Wm.

Fare Boxes
Cleveland Fare Box Co.
Johnson Fare Box Co.
National Railway Appliance Co.
Ohmer Fare Register Co.

Feed Water Heating
Schutte & Koerting Co.

Fences, Woven Wire and Fence Posts
American Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.
Star Brass Works.

Fibre and Fibre Tubing
Continental Fibre Co.
Westinghouse Elec. & Mfg. Co.

Field Coils. (See Coils)

Filters, Water
Scaife & Sons Co., Wm. B.

Flaxlinum Insulation
National Railway Appliance Co.

Floodlights
Electric Service Supplies Co.

Flooring Composition
American Mason Safety Tread Co.

Forgings
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
Williams & Co., J. H.

Frogs, Track. (See Track Work)

Fuses and Fuse Boxes
Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
Williams & Co., J. H.

Fuses, Refillable
Columbia M. W. & M. I. Co.
General Electric Co.

Gages, Oil and Water
Ohio Brass Co.

Gaskets
Power Specialty Co.
Westinghouse Traction Brake Co.

Gas-Electric Cars
General Electric Co.

Gas Producers
Westinghouse Elec. & Mfg. Co.

Gates, Car
Brill Co., The J. G.

Gear Blanks
Standard Steel Works Co.

Gear Cases
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Westinghouse Elec. & Mfg. Co.

Gears and Pinions
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
English Electric Co., Ltd.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Goggles, Eye
Indianapolis Switch & Frog. Co.

Gongs. (See Bells and Gongs)

Greases. (See Lubricants)

Grinders and Grinding Supplies
Indianapolis Switch & Frog Co.
Metal & Thermit Corp.
Railway Track-work Co.

Grinding Blocks and Wheels
Railway Track-work Co.

Guards, Cattle
American Bridge Co.

Guards, Trolley
Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley
Anderson M. Co., A. & J. M.
Bayonet Trolley Harp Co.
Electric Service Supplies Co.
Hensley Trolley & Mfg. Co.
Nuttall Co., R. D.
Star Brass Works

Headlights
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Heaters, Car (Electric)
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co
National Railway Appliance Co
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Cooper Heater Co.
Smith Heater Co., Peter

Heaters, Car (Stove)
Electric Service Supplies Co.
Smith Heater Co., Peter

Helmets, Welding
Indianapolis Switch & Frog Co.

Hoists and Lifts
Columbia M. W. & M. I. Co.
Ford-Chain Block Co.
Niles-Bement-Pond Co.
Yale & Towne Mfg. Co.

Hose
Ingersoll-Rand Co.

Hose, Bridges
Ohio Brass Co.

Hydraulic Machinery
Niles-Bement-Pond Co.
Watson-Stillman Co.

Injectors
Schutte & Koerting Co.

Inspection
Electrical Testing Lab's

Instruments, Measuring, Testing and Recording
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Insulating Cloth, Paper and Tape
Anchor Webbing Co.
General Electric Co.
Hope Webbing Co.
Okonite Co., The
Westinghouse Elec. & Mfg. Co.

Insulating Machinery
American Insulating Machinery Co.

Insulating Materials, China and Porcelain
Jeffery-Dewitt Co.

Insulation. (See also Paints)
Anderson M. Co., A. & J. M.
Electric Ry. Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Okonite Co., The
Westinghouse Elec. & Mfg. Co.

Insulators. (See also Line Material)
Anderson M. Co., A. & J. M.
Creaghead Engineering Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Macallen Co., The
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Insulator, China, Porcelain and Composition
Jeffery-Dewitt Co.

Insulator Pins
Electric Service Supplies Co.
Hubbard & Co.

Insulators, Section
Flood City Mfg. Co.

Inventions Developed & Perfected
Peters & Co., G. D.

Jacks. (See also Cranes, Hoists and Lifts)
Buckeye Jack Mfg. Co.
Buda Co.
Columbia M. W. & M. I. Co.
National Ry. Appliance Co.
Watson-Stillman Co.

Joints, Rail
American Chain Co., Inc.
Lackawanna Steel Co.
Zelnicker Supply Company, Inc., Walter A.

Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.
Railway Roller Bearing Co.

Laboratories
Electric Testing Lab's

Lamp Guards and Fixtures
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Arc and Incandescent. (See also Headlights)
Anderson M. Co., A. & J. M.
General Electric Co.
National Electric Specialty Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Signal and Marker
Nichols-Lintern Co.
Ohio Brass Co.

Lathe Attachments
Williams & Co., J. H.

Lathes, Car Wheel
Niles-Bement-Pond Co.

Leather Cloth
Standard Textile Products Co., The

Lightning Protection
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Line Material. (See also Brackets, Insulators, Wires, etc.)
Anderson M. Co., A. & J. M.
Archbold Brady Co.
Columbia M. W. & M. I. Co.
Creaghead Eng. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
English Electric Co., Ltd.
General Electric Co.
Hubbard & Co.
Macallen Co., The
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Locking Spring Boxes
Wharton, Jr. & Co., Inc., Wm.

Locomotives, Electric
General Electric Co.
McGuire-Cummings Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Lubricating Engineers
Galena-Signal Oil Co
Universal Lubricating Co.

Lubricants, Oil and Grease
Borne, Scrymser Co.
Galena-Signal Oil Co.
Universal Lubricating Co.

Lumber. (See Poles, Ties, etc.

Machine Tools
Columbia M. W. & M. I. Co.
Niles-Bement-Pond Co.
Watson-Stillman Co.

Manganese Steel, Special T Work
Indianapolis Switch & Frog C
Wharton, Jr. & Co., Inc., Wm

Meters. (See Instruments)
Electric Service Supplies Co.

Mica
Macallen Co., The

Molding—Metal
National Metal Molding Co.

Motormen's Seats
Brill Co., J. G.
Electric Service Supplies Co.
Wood Co., Chas. N.

Motors, Electric
General Electric Co.
Westinghouse Elec. & Mfg. C

Motor and Generator Sets
General Electric Co.

Nuts and Bolts
Barbour-Stockwell Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.
Lackawanna Steel Co.

Ohmmeters
Weston Elec'l Instrument Co

Oil Burning Equipment
Schutte & Koerting Co.

Oils. (See Lubricants)

Oxy-Acetylene. (See Cutting paratus, Oxy-Acetylene)

Packing
Power Specialty Co.
Westinghouse Traction Brake

Paints and Varnishes for Woodw
National Ry. Appliance Co.

Paving Material
American Brake Shoe & Fdry.
Barrett Co., The

Paving Pitch
Barrett Co., The

Pickups, Trolley Wire
Electric Service Supplies Co.
Ohio Brass Co.

Pinion Pulleys
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

Pinions. (See Gears)

Pins, Case Hardened, Wood and
Bemis Car Truck Co.
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Traction Brake

Pipe
National Tube Co.

Pipe Fittings
Power Specialty Co.

Standard Steel Works Co.
Watson-Stillman Co.
Westinghouse Traction Brake

Planers. (See Machine Tools)

Pliers, Insulated
Electric Service Supplies Co.

Plugs
National Metal Molding Co.

Pneumatic Tools
Ingersoll-Rand Co.

Pole Reinforcing
Hubbard & Co.

Poles, Metal Street
Bates Expanded Steel Truss
Electric Railway Equipment
Hubbard & Co.

Poles, Ties Post, Piling & Lumb
Duncan Lumber Co.
Western Red Cedar Assn.

Poles, Trolley
Anderson Mfg. Co., A. & J. M
Bayonet Trolley Harp Co.
Columbia M. W. & M. I. Co
Electric Service Supplies Co.
National Tube Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Electric Railway Equipment
National Tube Co.

They are uniform in quality

They talk for themselves

W. J. Jeandron
227 Fulton Street
New York City

Pittsburgh Office:
636 Wabash Building

Canadian Distributors:
Lyman Tube & Supply Co., Ltd.
Montreal and Toronto

Brake Shoes

A. E. R. A. Standards

Diamond "S" Steel Back is the Best Type

Standard Patterns for

SAFETY CAR

D-67 for Narrow Treads
D-87 for Wide Treads

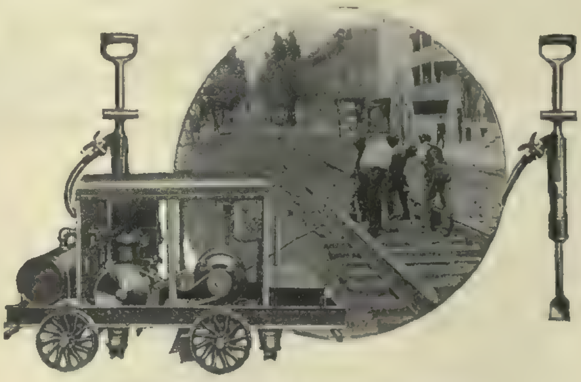
American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago Chattanooga, Tenn.

YOUR ROADBED

will be smoother and easier riding if tamped with "Imperial" Tie Tampers. Also, it will *stay* that way for a long time—an important item, especially where the ballast is overlaid with paving.

"Imperial" Tie Tampers save labor on this work, and they save labor on other jobs, for you can use them for tearing up any kind of pavement, cobble, asphalt or concrete.

The air furnished by the compressor may and should be used for bonding rails, tamping concrete, sandblasting, painting, and all the other useful ways that air can be applied.



The above shows a 2-tool "Imperial" Electric-Air Tie Tamping Outfit

You should have Bulletin 9132.
May we send it?

INGERSOLL-RAND COMPANY
11 Broadway, New York
35 Queen Victoria St., London

Offices the World Over

WHAT AND WHERE TO BUY

Potheads
Okonite Co., The

Power Saving Devices
National Railway Appliance Co

Preservatives
Barrett Co., The

Pressure Regulators
General Electric Co.
Ohio Brass Co.
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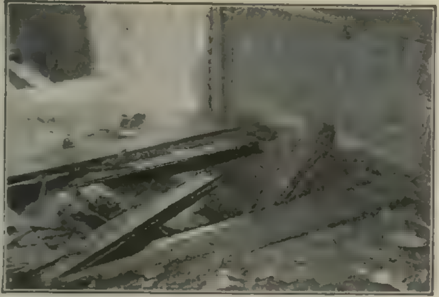

Decayed intermediate sills and flooring of freight cars.

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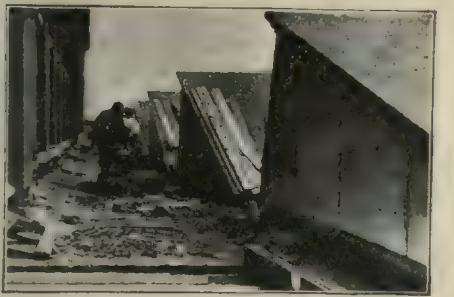
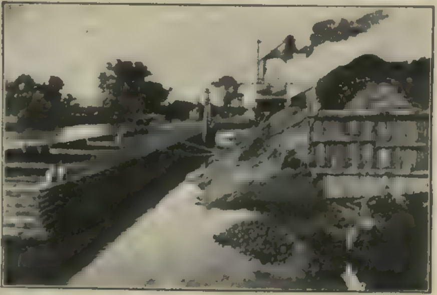


Removing decayed roof boards over textile mill —the penalty for neglecting to protect the lumber against decay before erection. *(Courtesy F. J. Hoxie, Eng. Assoc. Factory Mutual Fire Ins. Cos., Boston, Mass.)*



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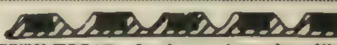

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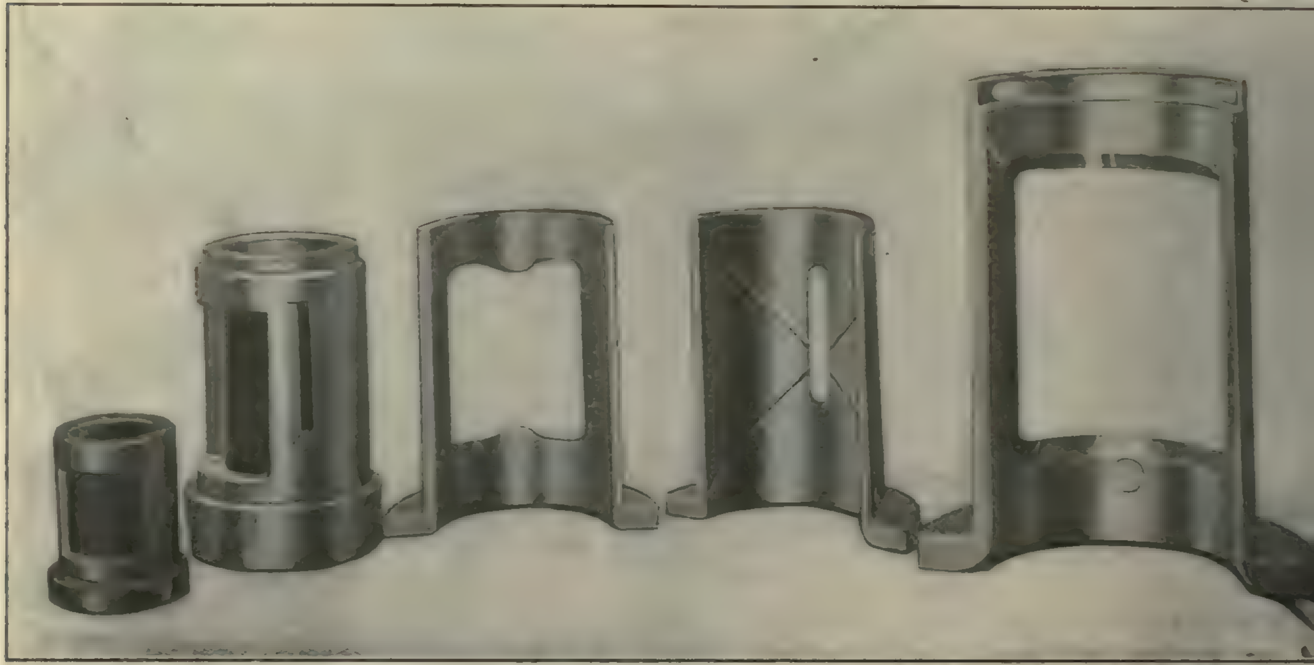

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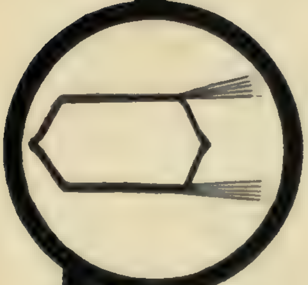

Armature Coil

Field Coil & Pole

WHAT other branch of your electric railway property offers a greater opportunity for economy and satisfactory service to the public, than that of your car equipments.

Westinghouse Repair Parts mean continued reliable service.

BrushHolder

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Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Westinghouse

ol. 57, No. 11 New York, March 12, 1921 *Pages* 475-514

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing-Editor

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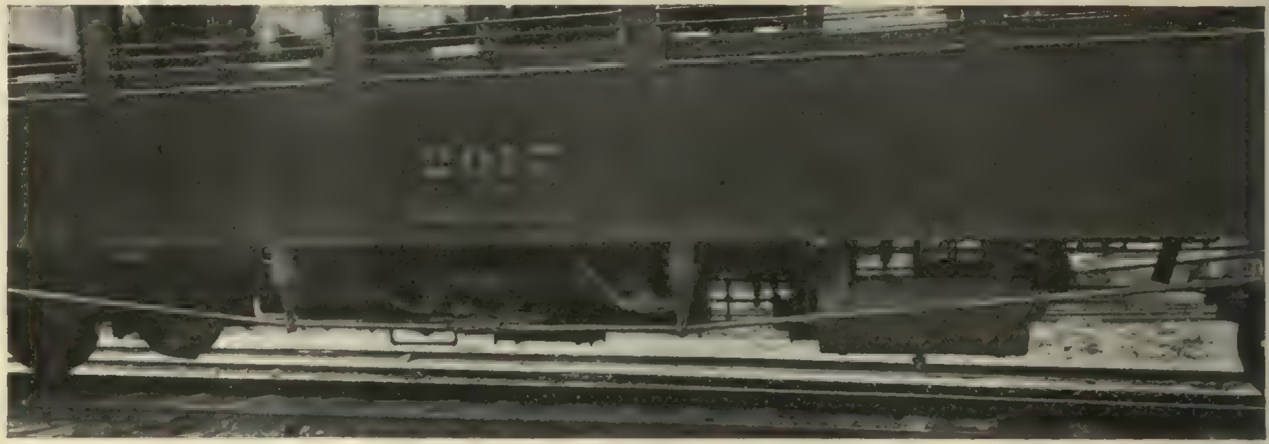
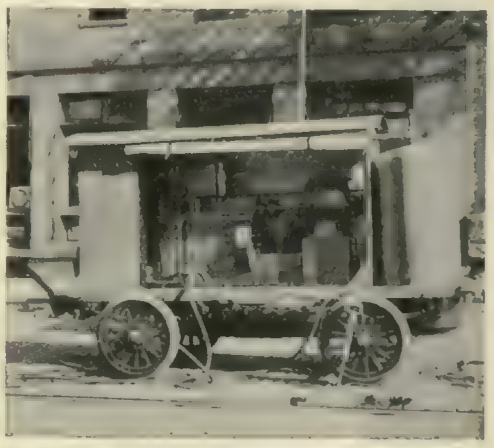


WESTINGHOUSE

SAFETY, EFFICIENCY AND ECONOMY

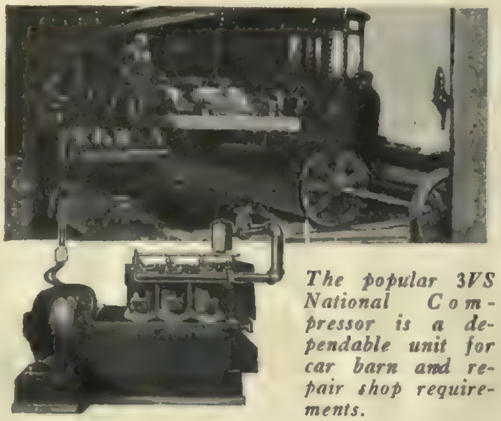


A Westinghouse National Portable Air Compressor for Track Repair Work and for Sand Blasting Rail Joints Before Welding.

THREE elements embodied in every Westinghouse product, whether Brake Equipment for rolling stock or a Compressed Air Plant for shop and track repair and construction work.

Apparatus with the Westinghouse imprint represents 50 years of experience in the Air Brake and Compressor business.

Save labor, fuel and time and safeguard your operations by specifying equipment built in accordance with the rigid standards of the Westinghouse organization.



The popular 3VS National Compressor is a dependable unit for car barn and repair shop requirements.

Westinghouse Traction Brake Co.
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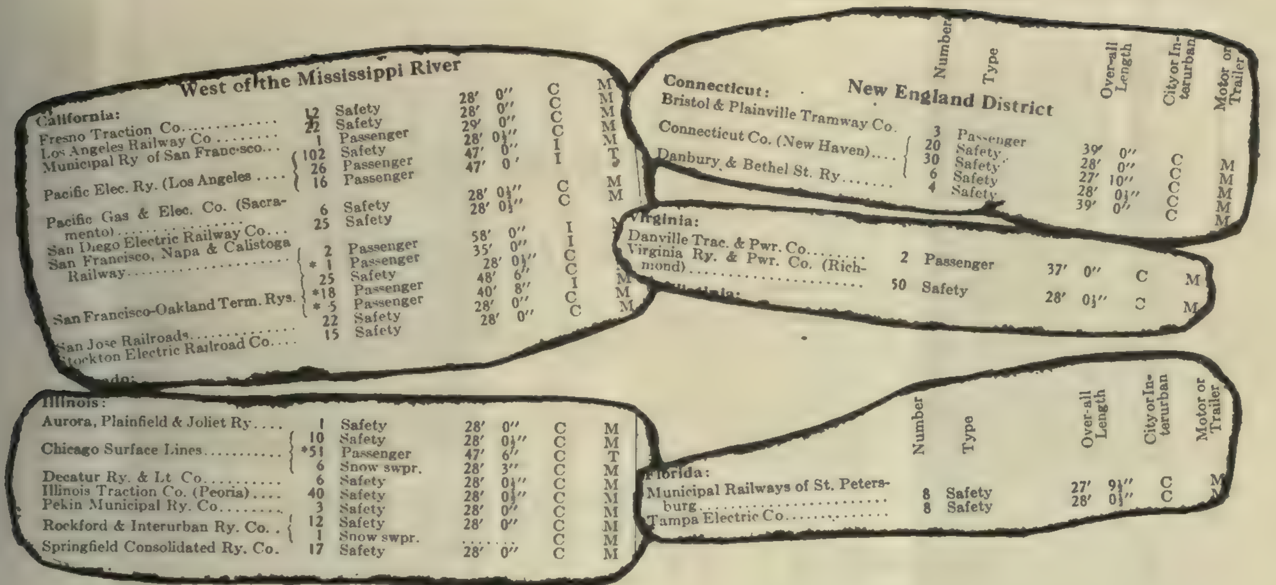

West of the Mississippi River

California:					
Fresno Traction Co.	12	Safety	28′ 0″	C	M
Los Angeles Railway Co	22	Safety	28′ 0″	C	M
Municipal Ry of San Francisco	1	Passenger	29′ 0″	C	M
Pacific Elec. Ry. (Los Angeles	102	Safety	28′ 0½″	C	M
	26	Passenger	47′ 0″	I	M
	16	Passenger	47′ 0′	I	T
Pacific Gas & Elec. Co. (Sacramento)	6	Safety	28′ 0½″	C	
San Diego Electric Railway Co.	25	Safety	28′ 0½″	C	M
San Francisco, Napa & Calistoga Railway	2	Passenger	58′ 0″	I	M
	* 1	Passenger	35′ 0″	I	
San Francisco-Oakland Term. Rys.	25	Safety	28′ 0½″	C	
	*18	Passenger	48′ 6″	C	M
	* 5	Passenger	40′ 8″	I	M
San Jose Railroads	22	Safety	28′ 0″	C	M
Stockton Electric Railroad Co.	15	Safety	28′ 0″	C	

New England District

	Number	Type	Over-all Length	City or Interurban	Motor or Trailer
Connecticut:					
Bristol & Plainville Tramway Co.	3	Passenger	39′ 0″	C	M
Connecticut Co. (New Haven)	20	Safety	28′ 0″	C	M
	30	Safety	27′ 10″	C	M
	6	Safety	28′ 0½″	C	M
Danbury & Bethel St. Ry.	4	Safety	39′ 0″	C	M

Virginia:					
Danville Trac. & Pwr. Co.	2	Passenger	37′ 0″	C	M
Virginia Ry. & Pwr. Co. (Richmond)	50	Safety	28′ 0½″	C	M

Illinois:					
Aurora, Plainfield & Joliet Ry.	1	Safety	28′ 0″	C	M
Chicago Surface Lines	10	Safety	28′ 0½″	C	M
	*51	Passenger	47′ 6″	C	T
	6	Snow swpr.	28′ 3″	C	M
Decatur Ry. & Lt Co.	6	Safety	28′ 0½″	C	M
Illinois Traction Co. (Peoria)	40	Safety	28′ 0½″	C	M
Pekin Municipal Ry. Co.	3	Safety	28′ 0″	C	M
Rockford & Interurban Ry. Co.	12	Safety	28′ 0″	C	M
	1	Snow swpr.	....	C	M
Springfield Consolidated Ry. Co.	17	Safety	28′ 0″	C	M

	Number	Type	Over-all Length	City or Interurban	Motor or Trailer
Florida:					
Municipal Railways of St. Petersburg	8	Safety	27′ 9½″	C	M
Tampa Electric Co.	8	Safety	28′ 0½″	C	M

Safeties, Safeties Everywhere

East, south, north, west—down at the Gulf or north of the border—small roads or big roads—all of one mind.

At least 113 of 'em of one mind during 1920 alone, for that number of electric railways ordered 1699 SAFETY Cars.

Seven times out of ten, when it came to ordering rolling stock, last year, these electric railways decided that the SAFETY CAR was the only one they could afford to order for their particular needs.

Please glance at some of the names and places to convince yourself that there are no "local conditions" to interfere with your securing success in giving more service at less cost, provided that you also put your O.K. on the use of the same equipment, to wit, the famous SAFETY DEVICES combination of this company which makes any car a Safety Car because that car is then equipped with automatic laborless apparatus, so interlocked that, regardless of the illness or distraction of the operator, the power will be cut off instantaneously, the air brakes and sander apply immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed and the steps folded before the car can start, and when the airbrake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

Safety Car Devices Company
Boatmen's Bank Bldg., St. Louis
Chicago San Francisco New York Washington Pittsburgh

1 Entirely satisfactory for grinding joints, corrugations, or special work.

2 Operated by unskilled labor.

3 Minimum of metal is removed from rail head.

4 Simple design, ruggedly built.

5 Produces a finished surface which cannot be equalled with other grinders.

6 Impossible to damage rail.

7 Detachable outrigger provided with track wheels for mate rail adjustable to gauge.

8 Safety springs on derailing hoists prevent injuring operators.

9 Forty seconds to remove machine from track and to recommence grinding.

10 Shipped ready for use.

11 Occupies small amount of space.

12 Always ready for emergency.

13 Reduces track maintenance.

14 Results in a smooth easy-riding track surface.

15 Saves cost in short period of time.

—read these if you have any doubts about the

Reciprocating Track Grinder

Railway Track-Work Company
3132-48 East Thompson St., Philadelphia

Exclusive Agents—

ATLAS RAILWAY SUPPLY CO.,
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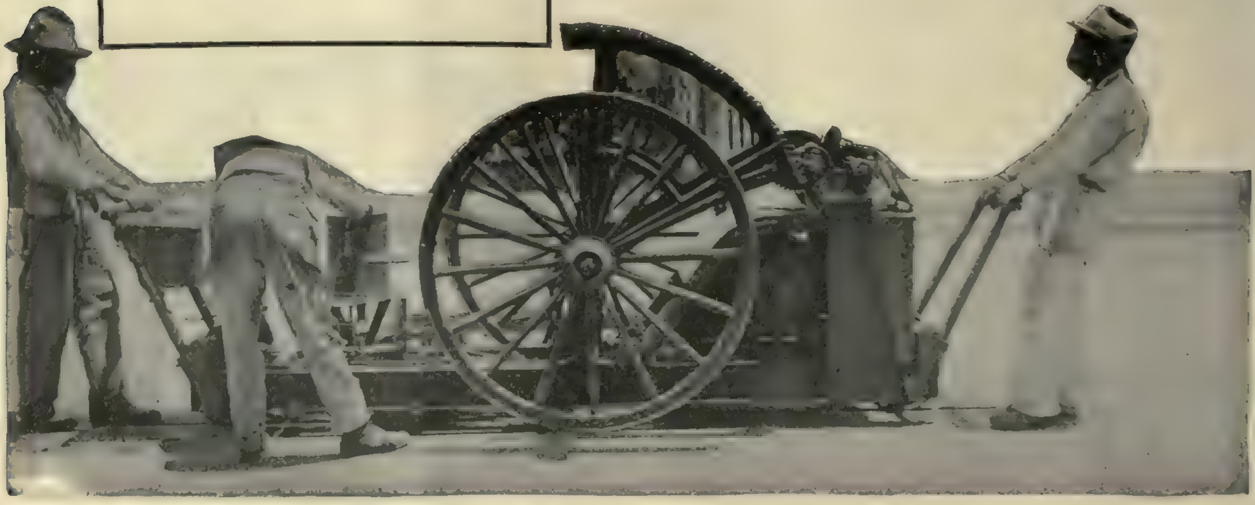

All Different—but equipped alike with
IMPERIAL INCANDESCENT HEADLIGHTS

Safety car, interurban, dense traffic motor car—each of the three solves a different transportation problem. But the proper headlight for everyone of them was found in the complete Crouse-Hinds Imperial.

Whether you need only a marker for bright city streets, a medium light for thinly settled territory or a powerful beam for private right of way, you'll find an Imperial for the service.

Besides Incandenscents, the Crouse-Hinds line includes Carbon Arcs and Luminous Arcs which maintain a strong light on subnormal voltage.

THE OHIO BRASS COMPANY, Mansfield, Ohio

New York Philadelphia
Pittsburgh Chicago
San Francisco Los Angeles
Paris, France

Manufactures: — Trolley Materials, High Tension Porcelain Insulators, Third Rail Insulators, Rail Bonds, Car Equipment Materials.

Exclusive Sales Agents in the U. S. for Crouse-Hinds Imperial Headlights.

10 Agasote Advantages

—and the
CURTAINS
for the finished
Car should b
PANTASOTE

Advantage No. 3

It Saves Labor

Agasote is supplied shaped and cut to size ready for application which materially simplifies the application and reduces labor costs, giving you the best type of roof made.

The Other 9

1. Has Great Strength.
2. Is absolutely weatherproof.
3. Requires No Auxiliary Coating or Covering Such as White Lead and Canvas.
4. Has high insulation value against temperature.
5. Makes a Cheaper Roof than Wood.
6. Is an Absolute Nonconductor of Current.
7. Is light in weight.
8. Holds Paint as Well or Better Than Wood or Steel.
9. Saves Time.

THE PANTASOTE COMPANY
11 Broadway, N. Y. People's Gas Bldg., Chicago, Ill.
751 Monadnock Bldg., San Francisco., Calif.

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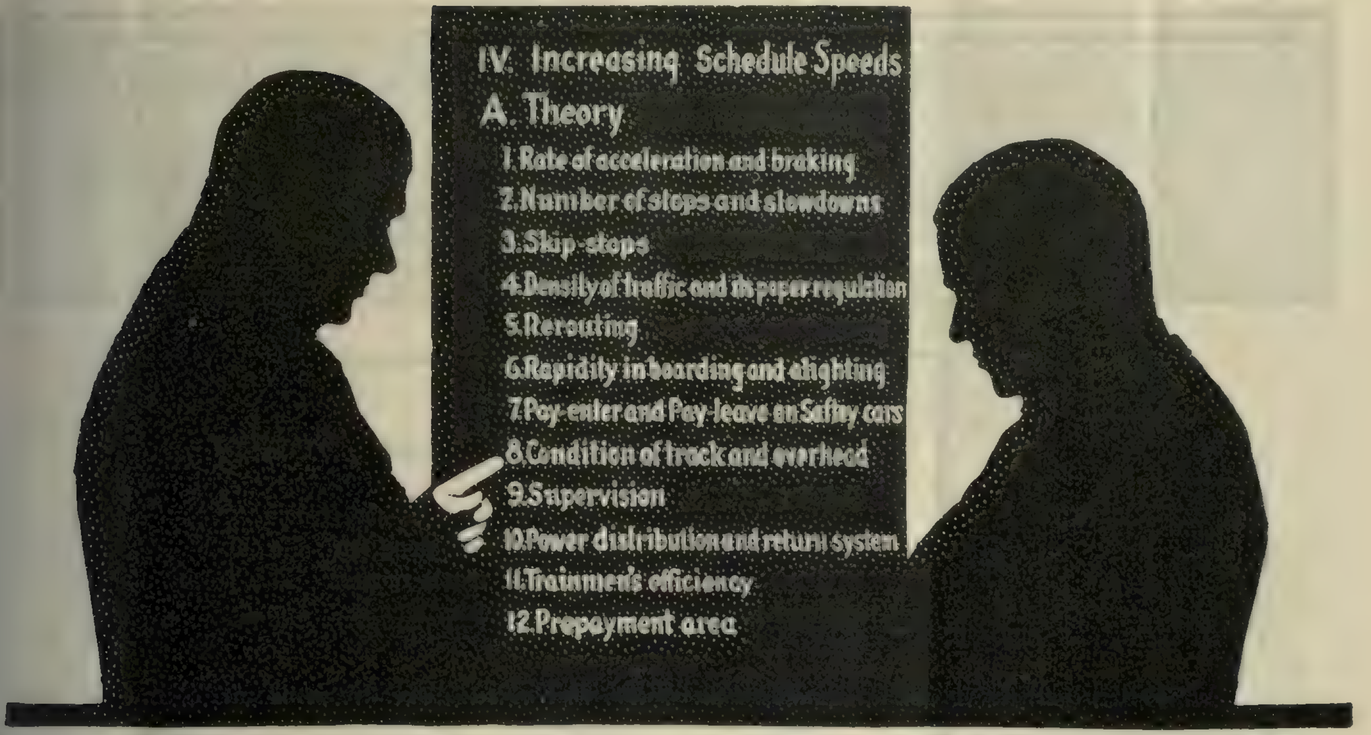
TRADE MARK
ROOFING


IV. Increasing Schedule Speeds
A. Theory
1. Rate of acceleration and braking
2. Number of stops and slowdowns
3. Skip-stops
4. Density of traffic and its proper regulation
5. Rerouting
6. Rapidity in boarding and alighting
7. Pay-enter and Pay-leave on Safety cars
8. Condition of track and overhead
9. Supervision
10. Power distribution and return system
11. Trainmen's efficiency
12. Prepayment area

Getting the Utmost Out of the Cars

"Good Track will increase the value of your present equipment"

THE SCENE is laid in the executive office of any medium or large sized street railway company. The dramatis personæ are a general manager and the superintendent of transportation. The plot opens something like this:

G. M. "I notice you have covered certain items under 'increasing schedule speeds,' the importance of which I fail to grasp. For example, what do you mean by the item 'condition of track and overhead'?"

S. T. "Since we have been paying such enormous prices for materials and labor, we have been forced to defer certain maintenance work. We have some sections of track that need repairs, so we have to make allowance in our schedule speeds for this bad condition. The same applies to the overhead, although in this case it is more a lack of copper than any physical condition that affects us."

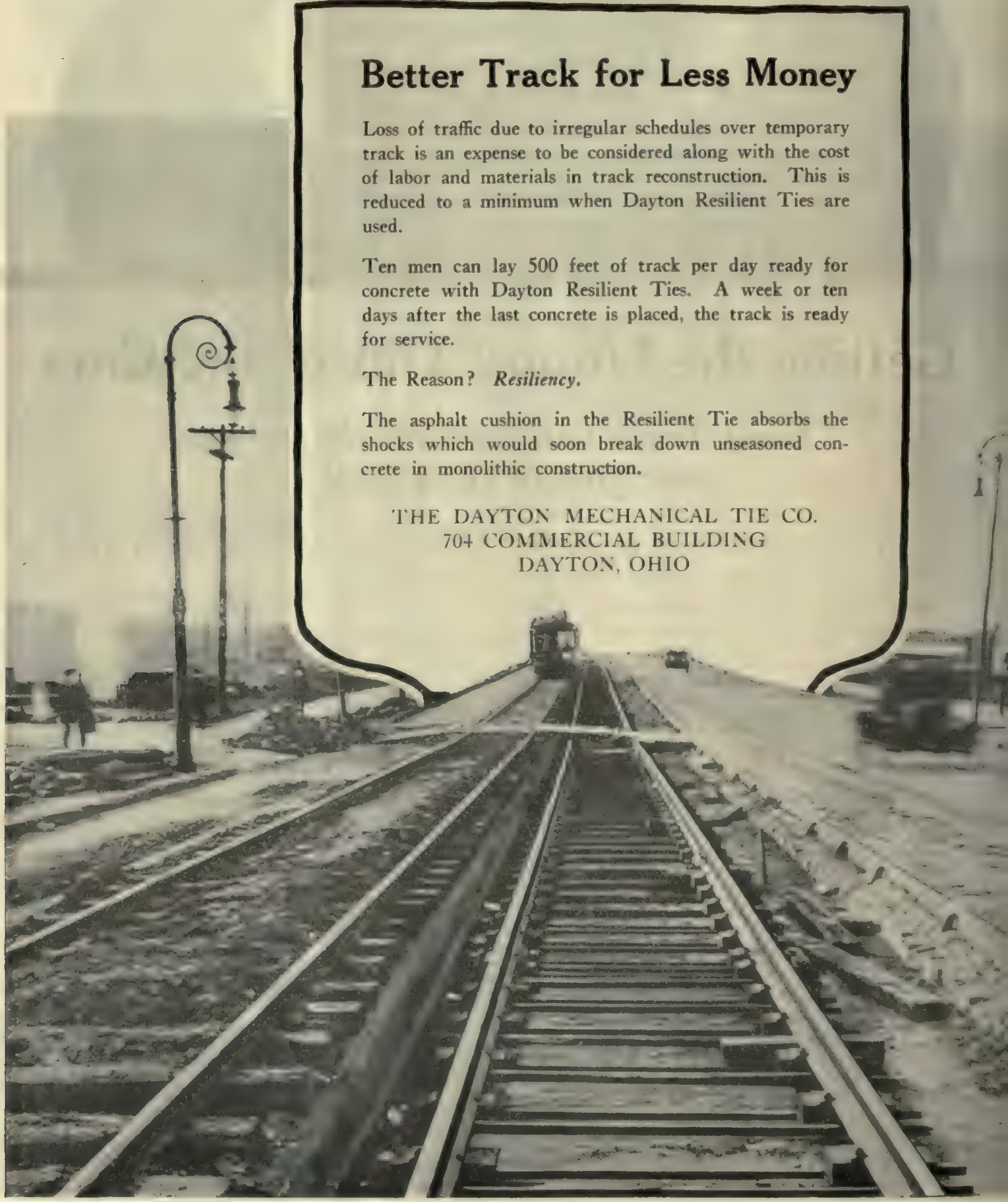
Reprinted with illustration from the Electric Railway Journal of Dec. 25, 1920, *in the interest of better* Paved Street Track.

The International Steel Tie Co., Cleveland, Ohio

Steel Twin Tie Track

The RESILIENT RAILWAY TIE

Builds Track with no come Back



Better Track for Less Money

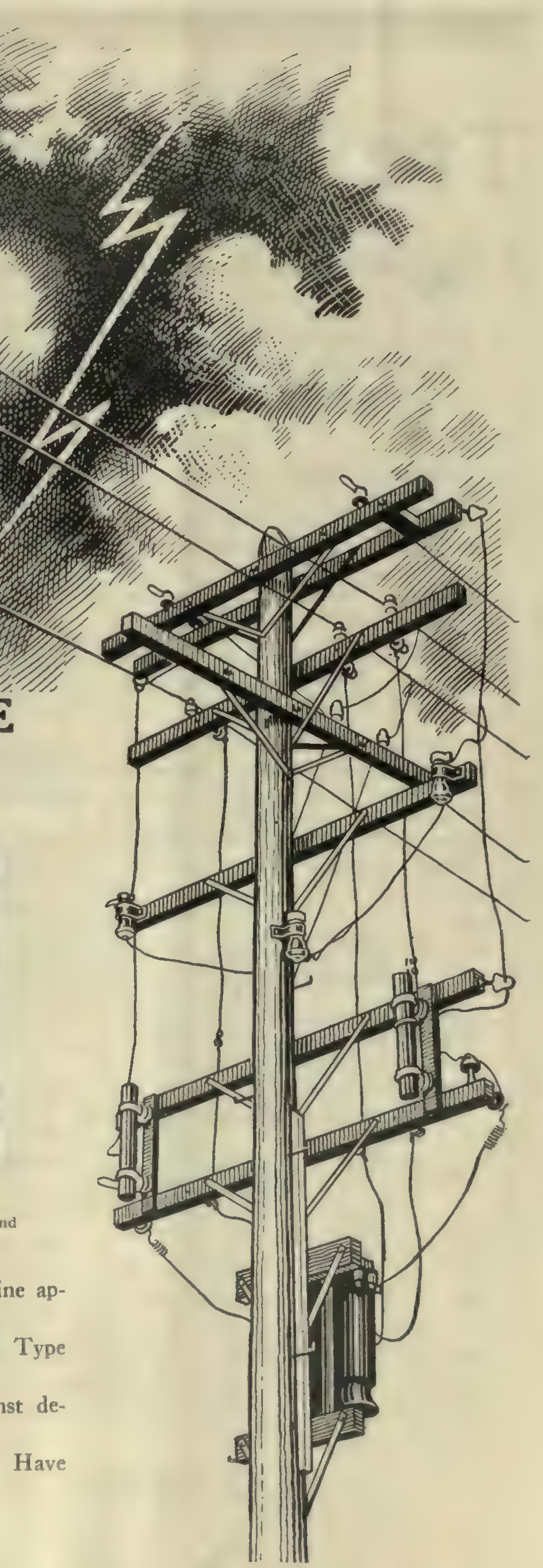
Loss of traffic due to irregular schedules over temporary track is an expense to be considered along with the cost of labor and materials in track reconstruction. This is reduced to a minimum when Dayton Resilient Ties are used.

Ten men can lay 500 feet of track per day ready for concrete with Dayton Resilient Ties. A week or ten days after the last concrete is placed, the track is ready for service.

The Reason? *Resiliency.*

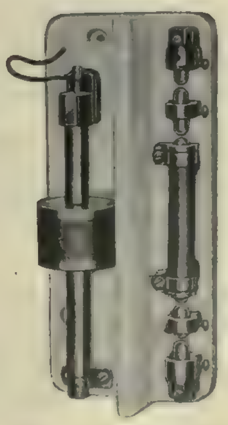
The asphalt cushion in the Resilient Tie absorbs the shocks which would soon break down unseasoned concrete in monolithic construction.

THE DAYTON MECHANICAL TIE CO.
704 COMMERCIAL BUILDING
DAYTON, OHIO



FOR REAL LIGHTNING PROTECTION—USE

Keystone Expulsion Type Arresters



Garton-Daniels A. C. and D. C. Arresters

t is economy for you not to risk destruction of your station and line apparatus but to protect it with Garton-Daniels lightning arresters.

'or the protection of your transformers the Keystone Expulsion Type Arrester illustrated above is most desirable.

ightning protection is not expensive—it is cheap insurance against detruction of apparatus, failures in service and loss of revenue.

3uy now—buy from the new Keystone-Garton-Daniels catalog. Have ou received your copy?

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ELECTRIC SERVICE SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Streets

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Branch Offices: Boston, Scranton, Pittsburgh.
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The Passing of the Nickel—

AS STREET-CAR fare the nickel is passé—proving that the public is essentially fair-minded when it has the facts. For no sane and fair-minded man would demand a street car ride for a nickel with costs of manufacturing that ride 100% above pre-war costs.

President Gadsden, of the American Electric Railway Association shows that more than 90% of the car riding public pay more than the old-fashioned nickel fare. Statistics from other sources show a marked trend toward the flat 10-cent fare.

Since January first, rate increases have been allowed in at least ten cities not included in the above.

Therefore today's average fare is close to 7½ cents, which coupled with the normal increase in traffic should bring the passenger revenue for 1921 to about 25-30% more than in 1917, with further increases assured for the future.

Marked Decrease in Receiverships

More tangible evidence of improved finances and increased buying power is found in the receivership statistics of the past four years:

Year	No. of Cos.	Miles of Single Track Involved	Outstanding Stocks	Securities Bonds
1917	21	1,177	33,918,725	33,778,400
1918	29	2,018	92,130,388	163,257,102
19 9	48	3,781	221,259,354	312,915,104
1920	16	992	25,313,655	68,860,575

Going back beyond 1917 we find that the mere existence of receiverships is no cause for excitement. In the palmiest days of the industry we find receiverships as great in numbers, mileage, and money as those recorded for 1920.

But receiverships *do* show the relative and changing financial status of an industry.

And the record for 1920 gives ground for only optimism and confidence, the improvement over 1919 being especially marked. In fact it can be said that the 1920 receiverships were about normal.

Increased Purchasing Power

THESE figures are presented to you as a manufacturer or a professional man with a product or service to sell to the electric railways.

If you study them carefully you will get a good measure of the absolute and relative buying power of the industry.

Unquestionably it is better by far than at any time in the history of the electric railway business, with tremendous growth during the past few years.

Taking car orders as an index, we find an increase of nearly 50% in 1920 over any of the preceding three years. There is increased buying power that cannot be denied.

The Future is Assured

THREE facts in Mr. Gadsden's statement stand out as an index to the future buying power and activity of the industry:

[1] General public interest in the welfare and credit of electric railways which will assure a flow of new money for extensions and betterments.

[2] Many maintenance projects long deferred for lack of funds in face of a real desire on the part of the operators to improve service and rehabilitate properties.

[3] Sufficient revenue to bring essential work up-to-date, take care of today's needs and carry out plans for future growth.

Thus we see America's greatest utility passing from a period of penalty and loss to one of prosperity and profit, justifying the unshakable confidence of the leaders of the industry during years of stress.

A Real Market and a Means of Reaching It

ELECTRIC RAILWAY JOURNAL is proud of the part it played during the lean as well as the prosperous years. Its leadership, predicated on the truth that an essential service must and will be successful, has been a tremendous force in bringing about the splendid and improving conditions of the industry today.

So we repeat:

The electric railway industry offers a permanent market for hundreds of millions of dollars worth of equipment, materials and supplies every year—a market that does not fluctuate noticeably with general business depressions and booms, but one which can be developed into the very "backbone" of your business, if your product has a real place in electric railway operations and if you have the vision, inspiration and courage to tell its story.

Incidentally, *Electric Railway Journal* is read by the men who buy for 98% of the electric railway mileage of United States and Canada.

ELECTRIC RAILWAY JOURNAL

Member Audit Bureau of Circulations
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Tenth Ave. at 36th St., New York

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION 1921

Modernize! *Pneumatize!*

To Make the Car Built Yesterday
Do the Work of Today

You have plenty of sound, attractive, easy-riding double-truck cars built within the last five or ten years.

The only thing wrong with them is that they are not equipped to turn out for you a profitable number of revenue miles per platform operative.

Make these cars produce the greater output necessary by equipping them with the *National Pneumatic* line of speed-up, safety-adding and labor-saving appliances to fit them for:

Two-men per car operation at higher schedule speed per hour for medium service.

One and one-half men per car (or less) operation by means of trains for heavy service.

One man per car operation for lighter service.

The right combination of these National Pneumatic devices will take care of any and all of the foregoing services.

National Pneumatic

Door and Step Control
Motorman's Signal Lights
Door and Step Operating Mechanisms
Safety Interlocking Door Control
and
Multiple Unit Door Control

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd.
Toronto, Ont.

National Pneumatic Company, Inc.
50 Church St., New York
Edison Bldg., Chicago
Works: Rahway, N. J.

Hundreds of miles daily of copper wire and strand

SPRING repairs and extensions, and new service requirements from the public, are certain to create heavy demands for electric railway materials.

To meet these demands, the American Copper Products Corporation has developed a specialized industrial organization equipped to meet every wire need of electric transportation. Its resources are indicated by its production of trolley wire. Accurately gauged, of uniform size, strong and tough, and of known conductivity, trolley wire for Railway use everywhere is produced at a rate aggregating many miles per hour.

A vast tonnage of other copper products, ranging from stranded cables to all sizes of bare wires and weatherproof wires and cables are produced daily, and an unbroken uniformity of product and unusual standards of quality are continuously maintained.

The volume production of its Bayway, N. J., plant, formerly Waclark wire mill, enables the American Copper Products Corporation to offer a service unusually advantageous to every electric railway engineer and contractor, and its situation on tide water, adjacent to New York harbor, affords economical rail and water shipments. Quick shipments of practically every copper need, in any quantity, can be made immediately and inquiries are cordially invited.

AMERICAN COPPER PRODUCTS CORPORATION

200 BROADWAY NEW YORK

COPPER PRODUCTS

Round Bare Wire	*Slow-burning Wire and Strand*
Bare Strand	*Bus Bars*
Trolley Wire—Round and Shaped	*Copper in Rolls*
Flat and Square Bare Wire	*Rolled Rods*
Tinned Wire and Strand	*Drawn Rods—Round, Square and Rectangular*
Weather-proof Wire and Strand	

BRASS & BRONZE PRODUCTS

Brass and Bronze Sheets
Brass and Bronze Round Wire
Brass and Bronze Flat and Square Wire

AMERICAN COPPER PRODUCTS CORPORATION

200 BROADWAY NEW YORK

About the man who "gets by" the conductor

There are a lot of people—(good, church-going people who would fall over in a faint if they were accused of stealing)—who seem to think that it's all OK to dodge paying their carfare every time they get a chance.

You can't change human nature and the job of moral uplift amongst the people who ride on your cars is up to the professional reformers, so you've got to get at these "fare dodgers" some other way.

Johnson Fare Boxes will make them see the error of their ways and convince them positively that it's their cue to deposit the required number of coins every time they ride on your property.

In other words, Johnson Fare Boxes and Metal Tickets insure maximum fare collection. It's a combination that's being used on more than 200 progressive Electric Railways. They're getting most of the fares formerly lost through inefficient methods of fare collection on their roads as high as 3 to 10%.

"Getting" the fare dodger is only one reason why you should install Johnson Fare Boxes. Our Engineering Department will give you the whole story if you'll let it. Write today and get all the facts.

JOHNSON FARE BOX COMPANY

Ravenswood, Chicago, Ill.

The World's best Lubricants

GALENA QUALITY

"Good as Galena"

When the oil salesman declares his product is "As good as Galena"—a statement that is often made when the lubrication contract is being considered—just bear in mind these facts:

When an Electric Car Oil can deliver, pint for pint, or gallon for gallon, as great a number of car miles—

When an Electric Car Oil can produce a clinging, protective film that keeps the journal cool and smooth—

When an Electric Car Oil can show in actual service its ability to prevent that expensive evil, the "hot box"—

Then, and then only, may it justify its claim to be "as good as *Galena Electric Car Oil.*"

These are the simple, every-day tests of service that show whether car oils possess the characteristic stamina of *quality*—tests that do their own talking.

Of the hundreds of electric railways in the United States, the large majority use Galena Electric Car Oil, for the reason that no other oil has been found able to deliver such efficient and economical lubrication and also because no other oil company is equipped to render such valuable helps in attaining safe and satisfactory operation, as is offered through the medium of Galena Service.

Galena Quality Is Our Bond
and Your Security!

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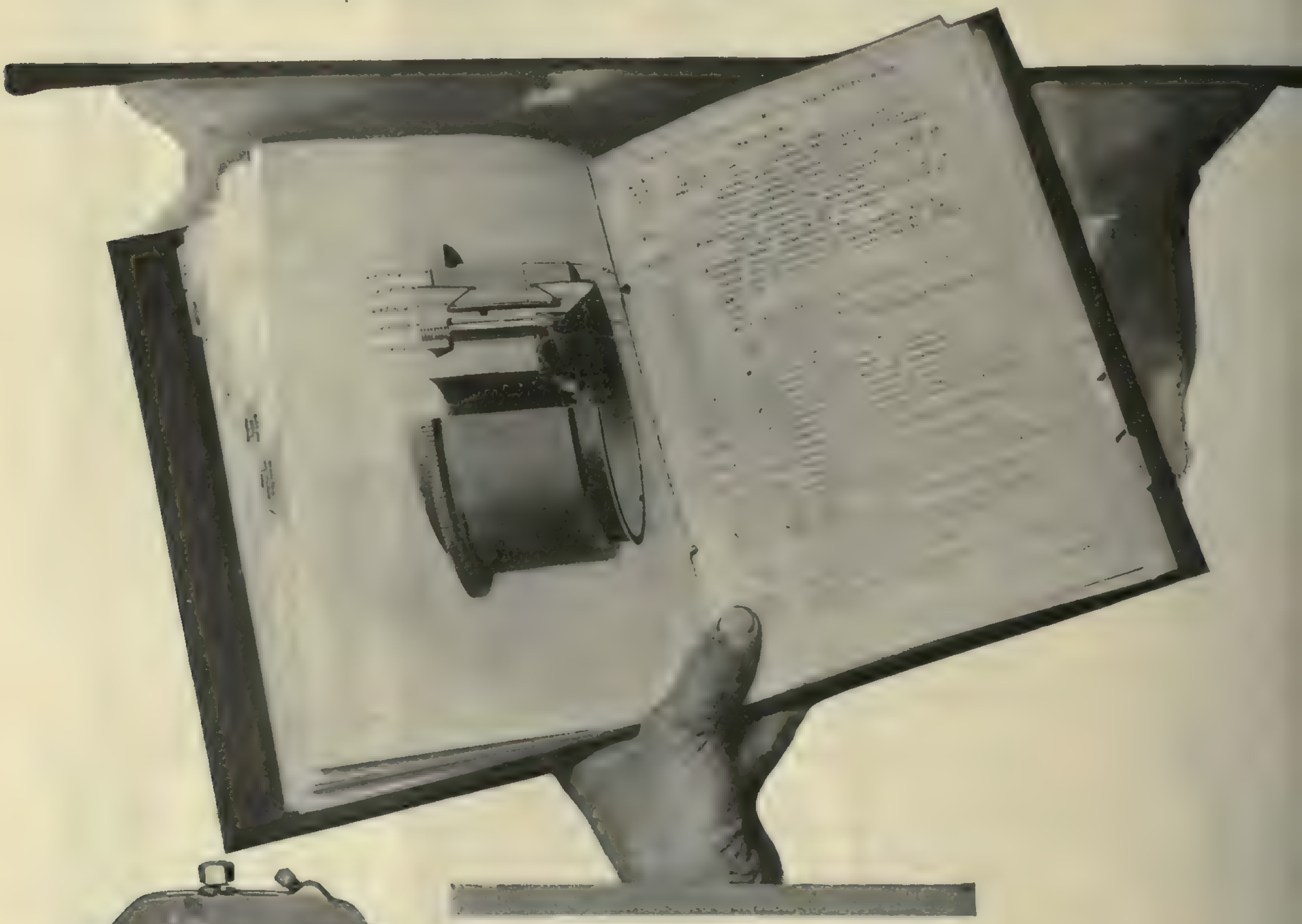
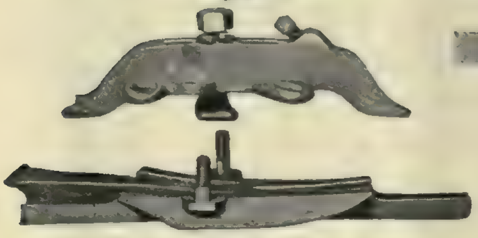
THE GALENA-SIGNAL OIL CO.
NEW YORK FRANKLIN, PA. CHICAGO
Offices in all principal American Cities
LONDON BUENOS AIRES PARIS

GALENA SERVICE

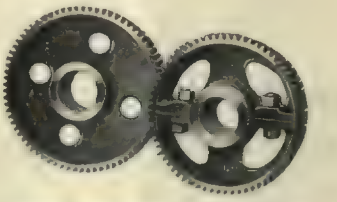
Every good railway man knows he cannot keep his equipment working at high efficiency if he picks renewal parts at random





Form N Removable Pan Trolley Frog.

Porcelain Insulators for Car Resistors.



Grade B and Grade M Gears. Extensively Used on Railway Motors.

Standardize on Good Material Then Stick to It—By The Book

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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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G. J. MACMURRAY, News Editor

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The Men Down the Line, as Well as the Boss, Have Brains

IN EXPLANATION of the good spirit which pervades a certain shop organization a foreman stated that the naster mechanic treated his subordinates as if they possessed gray matter in their craniums. This seems ike a simple and obvious proposition, but it merits more han a passing thought. After all, the men who in heir daily work come into contact with equipment eally know most about its shortcomings and are in a position to make excellent suggestions regarding the elimination of defects. Skilled mechanics are natural nventors, and they are in a position to invent useful practices if they know they are considered as more than nere machines, or as more than so many hands. Of ourse, through lack of opportunity to know what others have done, they will often, nay usually, reinvent what thers have previously produced, but it is better thus han a sluggish mind and an apathetic attitude toward task. Tactful leadership is required to secure alertess and efficiency in work without waste of effort in wild goose chases" after impracticable ideas. Such eadership, however, is necessary if the best results with nen are to be secured.

o Not Expect the Committee Chairman to Do All the Work

THIS paper has commented from time to time upon the work and activities of the standing committees f the Engineering Association. While the work of hese committees is in full swing, it seems worth while o call attention to the importance of committee work n general and to some matters in particular relating o their proper functioning.

In the first place the committees are organized to romote the advancement and application of scientific rinciples to the problems confronting the industry and o assist in the promotion of the education of the memers of the association as individuals. In view of these bjects, it is patent that membership in a committee alls for the performance of important duties and lays eavy responsibilities upon the individual members.

Some men accept committee membership lightly and xert no diligence in the work, not even to the extent f writing a letter; likewise they find trivial excuses r not attending meetings. Men of this character ave no place on committees, and failure to perform reasonable amount of work should be a bar to future ppointment. Committee appointments are in a large ense privileges which carry duties which may not ghtly be discharged. Mere "ornaments," who like to e their names in a list of committee members and efrain from justifying their appointment by engaging gorously in the work, are hindrances to effective comittee activity.

Sometimes the chairman is not the right man in the ght place, but as a rule he has won his spurs through capable efforts while serving as a committeeman. It is obvious that the chairman should not be required to bear the responsibility for the work of the whole committee and at the same time find it necessary to do very much of the detail work. His function is principally that of an executive or manager who is expected to get results from the entire committee organization and to co-ordinate the work to the end that profitable reports are produced. Each committeeman should bear these facts in mind and endeavor to shoulder his part of the burden.

The reason why committees are divided into subcommittees for special consideration of each particular subject is that such division is necessary in order to develop intensive study, which always may best be done by small groups. It should be impressed upon each committeeman that the work of his sub-committee needs all the attention he can give it. And it is quite true that busy men can do a large amount of effective committee work if this work has really enlisted their interest. Time can usually be found for those things which are enjoyed in the doing.

Active committee work will generally yield a large return to the individual, and the meeting of minds during meetings of the committees cannot do otherwise than improve the mentality of those participating. The best results have only been attained by those committees wherein every member has done his level best to aid in the work. It should be remembered that the slang phrase "let George do it" is entirely out of place in committee work, particularly when "George" is supposed to be the chairman either of the whole committee or of the sub-committee.

Telephone Interference Factor Not an Accepted Unit

THE use of the "telephone interference factor" as an accepted and established standard of measure of the electrical interference of power lines on telephone circuits is being attempted. This intention developed at a recent hearing before one of the principal state public utility commissions, where this factor was entered as evidence by a witness under examination, who cited the American Institute of Electrical Engineers as the authority for the establishment of the unit. Those familiar with the activities of the Institute will recall that a study was undertaken, but by no means completed, to determine whether such a factor could be set up. At the present time the inductive interference committee of the National Electric Light Association and the wave shape committee of the Institute are carrying on studies designed to provide definite information from which further conclusions may be drawn. But at present there is no such factor with any official or authoritative sanction, and this fact should be borne in mind by electric railway engineers in participating in interference negotiation.

What Makes Transportation Customers?

IN A recent report on the traffic-provoking proclivities of large unit fares versus short-ride fares a noted engineer expressed the opinion that the large unit fare for a city, irrespective of distance, was the more valuable in promoting riding, inasmuch as it encouraged the spread of the population beyond walking limits. To put the thesis baldly: The way to secure riders is to generate conditions that preclude walking.

This statement bears affinity to that enunciated by the Hebrew glazier. Asked how he had built up his business, he remarked with a palpebral spasm of the left eye: "In the night mine boys goes out to break windows. In the morning I goes out to fix 'em. Dat's why I'm so busy alvays."

The subject of "What makes transportation customers?" offers too extensive a field for discussion to be taken up in detail here. The old story of the jocose glazier is quoted simply to point the moral that no business attains maximum selling power through the imposition of arbitrary force, no matter how concealed. We are all pretty confident that the prosperity of glaziers is not dependent upon the number of broken windows, but upon the extent of building activity and the growing appreciation of the value of glass in securing more light and, therefore, promotion of health and economy in artificial illumination. In other words, the glass industry wins out because people have been taught to want more glass.

The same psychology holds in the case of transportation. It is conceivable that a long-ride town may have more rides per inhabitant than a short-ride town if neither of the railways possesses the selling instinct. No undue risk is taken when the assertion is made that the short-ride town will show much the better results of the two if its management preaches with right service, right fares and right publicity the doctrine that every minute saved by the higher speed of the car is a minute added to the active life of the car user.

Are Poorly Paying or Abandoned Lines Worth Saving?

MUCH good should come of the investigation to be conducted under the direction of the Massachusetts Legislature of the reasons for electric railway abandonment in that state and what can be done about it, if anything. The study will be conducted by the Department of Public Utilities and will cover four topics. The first is to learn what railways, whether in operation now or not, are necessary to promote the public welfare and convenience in the localities served. The second is to determine whether it is desirable to restore service on any of the discontinued lines. The third is to decide whether the additional cost of service on lines now in operation above the popular unit fare should be borne by the public and if so how apportioned, and the fourth is whether the state should own and operate lines deemed necessary for the public welfare and convenience.

Undoubtedly some of the properties already abandoned or about to be abandoned never could have paid their way, even under more favorable conditions of operation than now exist. Another group probably would have continued to have earned living expenses and served the public if it had not been for the advent of the automobile, which has taken away a considerable part of the travel. A third group would probably have survived even this competition, if they have not been overwhelmed by burdens with which the railway man i familiar and which take the form of taxes, paving an bridge charges, and assessments of other kinds.

It will be part of the duty of the new commission t determine which of the roads composing these severa groups are worthy of living or resuscitation. All perhaps are not. Nevertheless some of the lines no abandoned undoubtedly should be kept going in th interests of general economy. Finally, there is a goo sized group whose construction would not now be considered, but are worth keeping because the tracks ar now in. For such particularly the suggestion made i this paper some time ago by R. W. Perkins, presiden of the Shore Line Electric Railway of Connecticut, migh be worth consideration. This was that the state shoul own the tracks, just as it owns the highways, for th sake of promoting travel. Then the rails could be lease to an operating company. Another principle for guidance was outlined at a hearing before the commissio by F. J. MacLeod, street railway counsel, who suggeste that each person of a community derives a double benefi from the local trolley line. One was individually as car rider. The other was from the benefit which th community as a whole received. For the former h might well pay as high a fare as the traffic will bea without unduly discouraging the use of the utility. Fo the latter benefit, the community as a whole can properl contribute through taxes to the extent that the fares a determined by the plan mentioned above are insufficien to defray the legitimate costs of service.

Somewhat Different Motives Are Impelling Railroad Electrification Abroad and Here

WHILE railroads in the United States are markin time in the matter of electrification, pending th arrival of rejuvenated credit and cheaper money, the can learn much by keeping in touch with the accelerate electrification movement abroad. At the same tim they must make due allowance for the differences i conditions which are bringing about electrification, an which are dictating the purpose of electrification on th two sides of the Atlantic. There the dominant motiv is conservation, here it is increase in track capacity.

In all of the discussions of substitution of electrica motive power for steam in Great Britain and on th continent of Europe, the principal stress is being lai on saving in fuel. Some countries are dependent upo imported fuel, and obviously the less they are obliged t import the better for them. In other countries fuel i scarce and expensive, while "white coal," as water powe has been felicitously nicknamed, is abundant. Wit the strong government backing which electrification ha on the other side, the conservation appeal is stron enough to produce results.

While Americans want conservation, as well as man other desirable things, the economic pressure for it i this country is not yet sufficiently strong to overcom the forces which are holding back electrification here The most powerful of these resisting forces are financial the present difficulty of securing the capital needed fo the change and the prospective one of making end meet after the change is made. Again, a self-contained one might say self-sufficient, motive-power unit like th steam locomotive is ideal from many points of view Moreover, the steam locomotive is being improved so a o reduce the margin of possible fuel saving by change f motive power. But when a railroad is up against he proposition of increasing its track capacity, entirely lifferent considerations enter. Wherever there is overaxed track, electrification offers in general the cheapest olution of the congestion problem. Except where cerain non-economic factors dictate, such as the necessity or eliminating smoke and gases in tunnels, the best lace at which to expend the money that is available for lectrification is at the congested points.

Besides the two salient differences which have been ointed out above, there are numerous minor consideraions which require the discounting of European experince in application to American conditions. Here the endency is toward enormously heavy tonnage trains, whereas there drawbars are weak and trains light. On he other side speed seems to be favored rather than ractive effort. The penchant of European railways or trying out new types of locomotives ought to be eneficial to railroad engineers in the United States. t present there is much of this process going on. This ends great technical interest to the present electrificaion activity on European roads.

he Madison Experiment with Safety Cars

THE standard type of safety car has been adopted by so many roads in the country it is not surprisg that modifications have been suggested in it. Some f these have related to the construction of the car withut change in its general design, so that in a sense they ay not be considered as involving in any way the nterchangeability of the car or its use on a system where rs of standard safety dimensions only are employed. ther changes have gone further, and of these probably e two which have been advocated more than any others rovide for an increase in the size of the car to be used ith one-man operation and an increase in the number f doors from one to two.

The thought underlying the standard plan of single ntrance and exit for the standard safety car was that would be of no value to interchange passengers faster an they could be handled by the car operator from the ual points of safety and efficient fare collection. Hence e one-way, single-file arrangement has prevailed, and e increased standing time has been more than offset most everywhere by the greater acceleration and rerdation effected, as well as the fewer stops caused by e smaller capacity car operated on a shorter headway, compared with its larger rival. Nevertheless, the lvocates of the two-door rrangement have contined their arguments in its vor, and this design is w receiving a trial at ladison, Wis. In the inrests of car design such test is desirable, because rguments in favor of the vo-door arrangement have en continuous and a trial the simplest way of dermining its real merit. he test at Madison so far said to be successful. should be borne in mind, wever, that this trial has been for only a limited time and on a very limited scale, as compared with the 4,000 or more safety cars of standard design in use elsewhere in this country. The conditions under which the test is being conducted also are exceptional, in so far as Madison is a college town and has few if any industries. Finally, a very great superiority for the two-door plan must be shown to commend it to the industry for adoption elsewhere to counterbalance the disadvantage it has of non-conformity to standard.

Efforts to increase the size and seating capacity of one-man cars over those of the standard safety car bring in a different set of considerations, as these efforts have been dictated in nearly all cases by a desire to convert former two-man cars to one-man operation rather than a desire to improve one-man car design. In some cases power operated doors and steps have been used, and in other cases they have not. Undoubtedly there are cases to which one-man cars of greater seating capacity than standard are adapted, these being generally on long suburban runs where the cost of running two-man cars would be so high that it would mean a very long headway, and where the average length of ride per passenger is considerable. In such cases there would not be the same tendency to congestion at the front of the car. Such a car, however, is avowedly an expedient and adapted only for definite and somewhat limited conditions. It is not suitable for congested city service.

The Indirect Economy of the Welder

EVERY electric railway management is now pretty well aware of the economy commonly effected through the use of a welding outfit to reclaim worn or broken equipment or special trackwork. This is the direct economy derived from extending the life of the piece required. There is also an indirect economy that is perhaps not so generally realized. An important track intersection will illustrate the point. Before the advent of welding outfits, it was necessary for the track department to purchase a replacement intersection at the first indication of failure or major deterioration, in order to have it on hand ready to install when the failure came. This might actually not occur for many months, but meantime several thousand dollars invested in the replacement is tied up and carried in the store's account. With the welder to depend upon, the superintendent of track knows that no matter how bad the intersection may get, he can always fix it up to give service for a few weeks more. Consequently, he does not need to purchase the new intersection until the full life of the old, as further extended by the welder, has been obtained, and until he is ready immediately upon receipt to put the new one in service.

This example multiplied over an entire railway system must mean a very substantial saving in the amount of money required to carry the store's account.

Quotation from the Federal Electric Railways Commission Report

No. 11

IT IS the law that utilities are entitled to a fair return upon the value of their property used in public service at the time of the inquiry. The methods for finding fair value are in dispute. No permanent solution of the electric railway question can be found in the absence of a finding of value for rate-making purposes. This applies to commission form of regulation, cost-of-service contracts, or public ownership and operation. The public should know what it is paying for, and this question cannot be settled without knowing what the property is worth.

Thirty Years of Municipal Operation

Municipal System in Ontario City Now Receiving Power from New Cameron's Falls Plant on Nipigo River, Purchasing This Through Hydro-Electric Power Commission of Ontario—City Also Has Small Water Power Development of Its Own—Some Early and Recent Facts Regarding the System Are Given

PORT ARTHUR, Ont., is a city of 12,000 or more inhabitants, which has had an interesting electric railway history. As in a number of other Canadian cities, the electric railways, as well as the other utilities, are municipally owned and operated. Desiring to study municipal operation at first hand, one of the editors recently visited this city and went over the property with M. M. Inglis, manager of the Public Utilities Commission of the city. The results of some of his observations are here set down, without comparison of conditions on other municipal or private properties. Port Arthur is located on the northwest coast of Lake Superior, contiguous to its slightly larger neighbor, Fort William. Both are wideawake little cities with many natural advantages and they are important lake ports, among other things being the western terminals for the Canadian Pacific line of lake steamers.

THE CITY POWER SUBSTATION IN PORT ARTHUR

The development of the electric railway system of Port Arthur was traced in an address which Mr. Inglis gave a short time ago before a body of citizens of that city. He said that the system was inaugurated in 1891 and it was, he thought, the first municipally owned electric railway in Canada. To start the railway debenture bonds were issued in the sum of $75,000 on March 1, 1891, the bonds to run twenty years and to carry an interest rate of 5 per cent. Today the railway is capitalized at more than $785,000, not only covering the city of Port Arthur but extending into the adjoining city of Fort William.

From 1891 to 1908 the ownership and operation of the Fort William extension centered in the City Council of Port Arthur, but in 1908 arrangements were consummated whereby that portion of the system in Fort William became the property of that city by purchase, and the dual system was placed under the management of a joint board, composed of members from both cities. This arrangement continued from 1908 to 1913.

At the end of 1913 a complete separation, so far as ownership was concerned, took place, each city owning its respective system but continuing a through car service on both systems. When the joint board official existence terminated in 1913, the control and management of the Port Arthur system reverted to the City Council of Port Arthur and continued in its hands until the Public Utilities Commission was formed in 1915, which now administers the street railway.

Two types of debentures were sold to provide for th financing of the electric railway, namely, sinking fu debentures and serial debentures. The total par val of those issues since 1891 is $940,184. Anual intere and sinking fund charges are now slightly under $70,00

The assets of the civic railway at present compri mainly the following physical properties: Twenty mil of track on a sing track basis, carhous and sheds, twenty-tw convertible cars, fi of which are singl truck cars; two tra cars, two combinati work cars and snov plows and sweeper one baggage car, o open trailer, powe plant machinery to th capacity of 2,500 h (the main power su ply being purchased overhead equipmen feeders, tools, et necessary for the o eration of the syster A simplified map reproduced to show the general layout of the railwa lines.

The principal supply of power for the Public Utiliti Commission was, until Dec. 20, 1920, furnished by t Kaministiquia Power Company, the power plant which is located 20 miles west of the city. From th company, through the Hydro-Electric Power Commi sion of Ontario, the city purchased 7,000 hp. at 32,0 volts, three-phase, 60 cycles. In addition the city ope ates a water-power plant on the Current River, whe approximately 2,500 hp. is produced at 2,200 vol three-phase, 60 cycles. Since Dec. 20 the power h been purchased from the Hydro-Electric Power Co mission direct.

The "Hydro Commission" furnishes this power fro its new development on the Nipigon River at Ca eron's Falls, about 70 miles east of the city. Whi the ultimate development on the Nipigon River w be in the neighborhood of 300,000 hp., provision being made in the initial development at Cameror Falls for six units of 12,000 hp. capacity each.

The power furnished by the "Hydro Commissio is brought to the eastern boundary of the city over transmission line of wood-pole construction, at 110,0 volts.

At the boundary is a terminal station where t pressure is reduced to 22,000 volts; from the te minal station 22,000-volt power feeders run to the c of Port Arthur substation, where the interswitchin transforming and distribution of the local power supp are centralized.

The Port Arthur substation was originally built in 1910, but was enlarged three years later to meet the increasing demands for power for industrial purposes. It contains two 500-kw. synchronous motor-generator sets, provided with direct-connected induction starting motors, with wound rotors. These sets are used exclusively for supplying power to the Port Arthur Civic Railway. The two incoming 22,000-volt feeders are provided with the usual protective switching and metering equipment and the two 2,200-volt outgoing feeders are similarly protected and are controlled through remote-control oil switches. Branching from the outgoing feeders, through air-break switches fitted with horn gaps and mounted outdoors, is an additional feeder.

TABLE I—PASSENGERS CARRIED, BY YEARS

	Revenue Passengers	Transfer Passengers	Annual Total	Boundary
1915............	2,102,373	407,719	2,510,092	....
1916............	2,407,190	341,023	2,748,213	....
1917............	2,997,974	248,970	3,246,844	From July to Dec. 304,007
1918............	3,877,543	241,789	4,119,332	749,656
1919............	3,944,269	288,486	4,232,755	782,603

Provision is also made on the outdoor construction work for the transfer of the load from one outgoing feeder to another in the event of failure of any one of the oil switches in the substation, by means of the aforementioned air-break switches and a transfer bus.

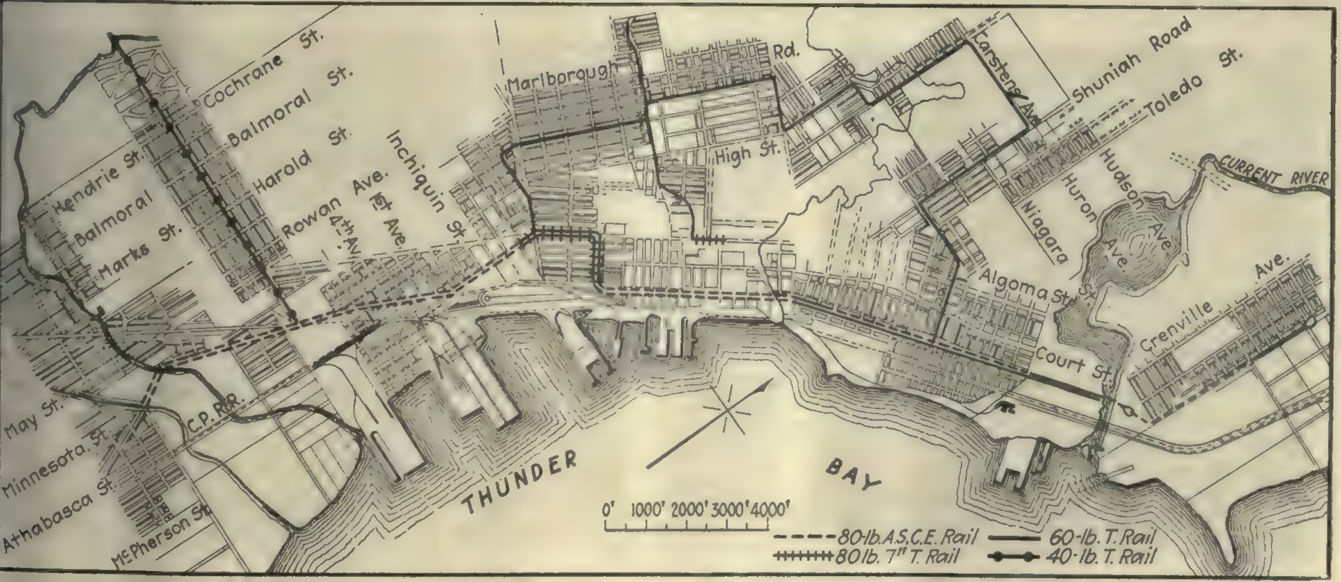
The substation also contains two sets each of three 750-kva., single-phase, oil-immersed water-cooled transformers for lowering the voltage from 22,000 to 2,200. There are also ten 2,200-volt remote-control feeder switches connecting the overhead distribution throughout the various sections of the city and supplying power for lighting transformers and small power consumers. Two 2,200-volt three-phase oil-immersed switches connected to overhead feeders are used in tying in the Current River power plant, which is about 2 miles from the substation.

The complete equipment of this substation was manufactured by Siemens Brothers, Stafford, England, and was supplied by the Siemens Company in Canada. Two photographs which are reproduced show the interior and exterior of this substation, including some of the outdoor overhead work, the motor-generator sets, and the 2,200-volt (low-tension) operating gallery.

HEADQUARTERS OF PUBLIC UTILITIES COMMISSION OF PORT ARTHUR, TYPICAL CITY CARS IN FOREGROUND

THIS WATER-POWER PLANT IS OVER TWENTY-FIVE YEARS OLD

The Current River power plant was built in the period from 1903 to 1905 and is today in first-class condition. It contains four Allis-Chalmers generators, three alternating current and one direct current, all direct connected to Jenckes horizontal water turbines. The alternators are respectively of 600-kva., 250-kw., and



ELECTRIC RAILWAY LINES IN PORT ARTHUR, ONT.

HERE THE CITY TRANSFORMS POWER FOR THE RAILWAY AND OTHER LINES

250-kw. capacity, and all are provided with their own belt-driven exciters. There is also a separate 15-kw., 37-volt turbine exciter set, and to furnish an additional supply of direct current there is a 300-kw. synchronous motor-generator set, with a geared starting motor which can be disconnected by shifting the pinion on the motor shaft.

In one of the illustrations of this plant a 250-kw. alternator and the 200-kw. direct-current generator are shown, and in another the switchboard is the conspicuous feature. The latter contains three alternating-current generator control panels in the foreground, and there are local alternating-current distribution control feeder panels and direct-current generator and motor-generator control panels. All panels are fitted with necessary instruments and protective relay equipment. This switchboard was furnished by the Canadian Westinghouse Company.

SOME OPERATING DATA FOR THE SYSTEM

The accompanying tables give some of the latest operating data available at the time of the preparation of this article. The fare on the system until Sept. 1, 1920, was 5 cents, since which date it has been 6 cents.

The year 1919 was notable in the recent history of the Port Arthur Railway in that during the year the road earned the interest on the bonds and the contribution to the sinking fund, which was accomplished by more than doubling the gross revenue while holding the expenses to an increase of about 50 per cent. In 1919 the number of employees was sixty-one and they were paid $88,000. In the same year insurance and incidentals cost $19,000 and power $20,000.

As to accident expense, the city has been fortunate in that during the past five years only $8,340, an average of $1,688 for a year, has had to be spent in settling claims. This is approximately 1 per cent of the annual gross earnings.

The schedule speed of the cars in Port Arthur, as well as those in Fort William, is high, averaging for the main-line cars about 11¼ m.p.h., although traffic conditions are making the maintenance of this speed increasingly difficult. City regulations require that a car shall stop at almost every street intersection. As in the downtown section the blocks are only about 250 ft. long, the speed in that section is necessarily slow.

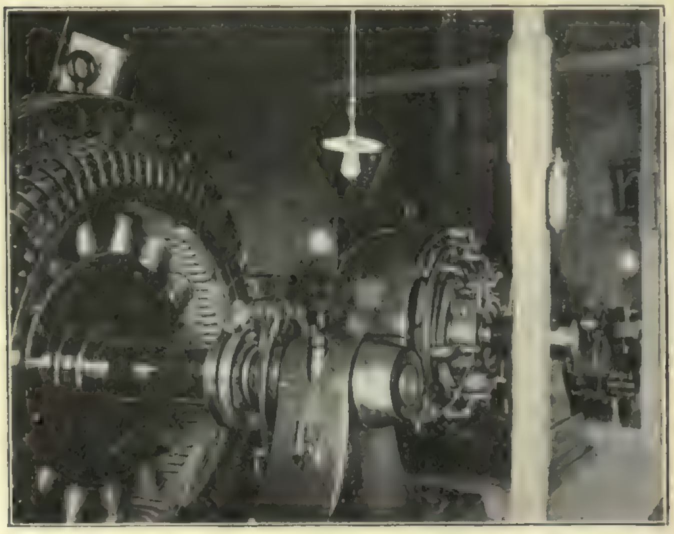
TABLE II—INCOME AND EXPENSE STATEMENT

	Gross Earnings	Maintenance	Operation	General Expenses	Total Operating Expenses	Net Operating Earnings	Interest, Sinking Fund, Etc	Net Income or Deficit
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
1915 ..	94,989	14,919	57,139	10,019	82,077	12,913	76,006	63,093*
1916 ..	106,299	20,910	59,419	8,698	89,028	17,272	68,325	51,053*
1917 ..	125,902	28,789	66,060	7,853	102,702	23,200	69,002	45,802*
1918 ..	152,606	29,710	74,508	9,594	113,812	38,794	68,949	30,155*
1919 ..	196,442	29,988	85,743	11,350	127,081	69,361	69,361	......

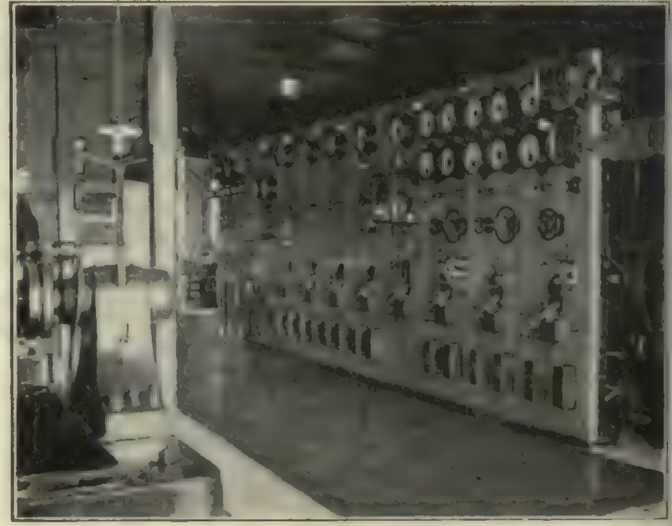
* Deficit.

TABLE III—OPERATING AND CAPITAL CHARGES PER CAR-MILE

	Maintenance	Operation				Total Operation	Capital Charges	Grand Total	Car-Miles per Annum
		Power	Motormen's and Conductors' Wages	Other Expenses	General				
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	
1915......	2.60	3.49	5.04	1.42	1.75	14.30	13.26	27.56	573,403
1916......	3.36	3.22	4.89	1.44	1.40	14.31	10.97	25.28	622,130
1917......	4.53	3.16	5.48	1.77	1.24	16.18	10.87	27.05	634,904
1918......	4.59	3 09	6.15	2.24	1.48	17.55	10.63	28.18	648,369
1919......	4.40	3 00	7.40	2.18	1.67	18.65	10 20	28.85	680,045



THESE VETERANS AT THE CURRENT RIVER PLANT LOOK GOOD AS NEW



SWITCHBOARD IN PORT ARTHUR'S CURRENT RIVER HYDRAULIC PLANT

Preparing for a Wage Arbitration

A Dialogue Purporting to Show that a Wage Settlement Involves More than Merely Selecting an Arbitration Committee—A Complete Outline for a Wage Study to Form the Company's Defense Is Presented

BY E. A. W.

"MABEL, please give me Superintendent Jim." A brief waiting period only follows, for, like everything else on this particular utility property, efficiency in telephone service is as close to 100 per cent as anything can be.

"Good morning, Jim. How is everything going? That's fine. When you get your mail out of the way will you come up? I've got a job that's going to require some work and I want your help. Thank you."

Some time later in the morning the amiable and efficient superintendent of transportation smiled his way into the general manager's sanctum.

G. M. "Hello! already? Jim, we have been served notice that the men want another increase in wages. It's not on the cards, but under the terms of our labor contract it will have to go to arbitration."

S. T. "Well, that's easy; let the arbitrators do the work."

G. M. "I wish that was all there was to it. No, James, m'boy, we have got to furnish them with facts and figures—statistics, real and not imaginary. One reason the boys are after more money is that they have been reading a lot of college incubated stuff, 'Vaporings of Veal.' Some silk-shirted, silver-spooned graduate of Yarvard, who never carried a dinner bucket in his life, let alone do a laboring man's work, and never paid labor out of his own pocket, compiles a lot of so-called cost-of-living dope, minimum comfort budgets, basic living wage, or what not, writes a story about it and tells the mysterious stranger in our midst, 'capital,' to dig down and pay a minimum wage of $2,346.71 a year. Why? Because from carefully (?) compiled estimates, $2,346.71 is the least amount a man can live on today and bring up a family of five. In other words, $2,346.71 will only provide the minimum comforts of life as calculated from the cost of food, clothing, rent, movies, an automobile, player-piano, and a provision for old age. Jim, if every employer in the country paid a minimum wage of $2,346.71 today, what would the minimum comfort budget be tomorrow; and what would we have to do to meet it?

"If some of these college professors would devote their attention to methods of increasing production and *decreasing* costs and would realize that there is not and never can be a basic cost-of-living, we would all be better off. Somebody has said that there are as many 'standards of living as there are families.' We know the American standard is the highest of any country in the world. But no one yet has been able to make a man provide for old age unless he wanted to, and no one yet has been able to make Mrs. Brown a thrifty, provident, efficient housewife just because Mrs. Smith is, although the latter lady's husband draws $25 less per month than Mrs. Brown's."

S. T. "Chief, you are right! Take some of our old boys for example; talk to them and they will tell you how they paid for their homes and laid something aside for the winter of life, and they'll also tell you the younger element on the system is the cause of all the agitation and discontent. The young fellow has no responsibilities to speak of. He wants more money to spend, not to save. He wants high wages and short hours to have more to spend and more hours to spend it in around pool halls and jazz parlors."

G. M. "Well, we've got to get busy. I want you to work up an outline of the things we'll need to present the facts properly to the arbitrators. Let's put the matter up in the form of exhibits and cover the main points something like this:

"I. Cost of Living.

"II. Classification of Employees and Their Compensation.

"III. Comparison of Employment with Outside Occupations.

"IV. Service Requirements for the Public.

"V. Ability of the Company to Pay; i.e., Income and Expenses.

"VI. Justice of a Shorter Working Day.

"VII. Chronology of Events Leading Up to Wage Arbitration."

The S. T. copied the above outline on an envelope from his pocket and retired. Several days later he again obtained audience with his chief, and laid before him the details hereinafter enumerated, which the G. M. and S. T. carefully reviewed item by item.

I. *Cost of Living.*
  1. Basic cost of living.
    a. State industrial commission's figures for this city
    b. United States Department of Labor figures for this city
    c. United States Department of Labor for cities of similar size in the United States
  2. Minimum cost of living.
  3. American standard of living (discussion)
  4. United States Department of Labor statistics
    a. Charts showing income groups
    b. Charts showing surpluses and deficits from various income groups
  5. Independent investigation made from study of market conditions and prices in newspaper files, and from prices submitted by various retail and wholesale houses, real estate agencies and from canvass made among employees
    a. Housing; rentals, or taxes and maintenance costs
    b. Carfare
    c. Food
    d. Clothing
    e. Fuel and light
    f. Health, medical attention, recreation
    g. Insurance; life, health, accident, fire, old age
    h. Sundries; charity, church, pleasure
  6. Actual study of size of families from canvass made among employees
  7. Application of values found under Section 5 to the individual members of the average family so as to arrive at values to apply to employees' families

8. Reference in detail to sources of information
9. Chart showing comparison of employees' compensation with basic living costs, pre-war time to present

II. *Classification of Employees and Their Compensation.*
1. Definition of total compensation
    - a. Actual wages
    - b. Transportation to employees and dependents
    - c. Insurance benefits and pensions
    - d. Uniforms
2. Each item defined under Section 1 above to be detailed, showing methods and rules surrounding each item of compensation other than wages
3. Above items spread against segregated classification of employees; i.e. employees grouped by departments and further by occupation; where compensation other than wages is paid for length of service, a further segregation into years of service will be made
4. Tabulation showing above spread against each man on the payroll, the headings of the column of this tabulation to be as follows:
    - a. Sequence in the order of compensation
    - b. Name
    - c. Rate of pay
    - d. Hours worked per month
    - e. Monthly pay
    - f. Turn-in allowance
    - g. Accident report allowance
    - h. Instructing student trainmen
    - i. Other miscellaneous cash compensation
    - j. Total cash compensation
    - k. Addition miscellaneous compensation
    - l. Total compensation
    - m. Days worked per month
    - n. Days failed to work
    - o. Maximum number of consecutive days off
5. Charts compiled from above data showing—
    - a. Per cent of trainmen in service (abscissae) against length of service in years (ordinates)
    - b. Voluntary resignation in per cent of trainmen plotted against length of service in years
    - c. Average age of employees in years plotted against length of service in years
    - d. The following curves on one chart:
        - 1. Basic living costs

      Average annual compensation of—
        - 2. All employees
        - 3. Regular trainmen
        - 4. Extra trainmen
        - 5. Shop employees
        - 6. Way and structures employees

      In each of these cases besides the general average compensation the compensation of the 10 per cent earning the maximum wages and the 10 per cent earning the lowest wage should be shown.
6. Wages paid for like occupations by other companies (listed by name) showing average rate paid after first year of service, and after the maximum hourly rate is reached; also length of service before reaching maximum rate.
7. Discussion

   Under this heading the desirability of the employment should be shown, its continuity or steadiness; flexibility in train service due to "sign-up" arrangements in effect; labor turnover as compared to other occupations; waiting list of men seeking employment and figures showing walks of life represented. It is a fact that almost every occupation and trade known is found on a street railway system. This is direct evidence of the desirability of employment.

III. *Comparison of Employment with Outside Occupations.*
1. List of outside occupations comparable with street railway work
    - a. Federal employees and their compensation
        - Mail carriers
        - Mail clerks, etc.
    - b. State employees and their compensation
        - Highway department laborers, foreman, etc.
        - Surveyors' assistants
        - Janitors
        - Clerks, etc.
    - c. City employees and their compensation
        - Firemen
        - Police
        - Laborers, etc.
    - d. Railroad occupations closely allied
        - Truckers
        - Gatemen
        - Pilots
        - Baggage-checkers
        - Station masters
        - Laborers, etc.

   Employees of:
    - e. Moving and storage companies
    - f. Office buildings
    - g. Hotels
    - h. Department stores
    - i. Wholesale houses
    - j. Retail groceries
    - k. Produce houses
    - l. Bakeries
    - m. Feed and grain establishments
    - n. Drug stores
    - o. Furniture stores and factories
    - p. Clothing stores and factories
    - q. Gasoline and lubricant stations
    - r. Tire industries
2. Seasonal employment in other industries
3. Tabulation and summaries showing average total compensation
4. Discussion in detail of street car platform and maintenance work and comparison with other occupations closely allied. (Here mincing of words or equivocating must not be resorted to; call a spade a spade. Take up each department and its subdivisions, cover the class of work done and the responsibilities and capabilities involved).
5. Chart showing—
    - a. Basic cost of living as in Section II, subdivision 5-d-1.

   Average annual compensation of—
    - b. Street railway platform men as in Section II-5-d-3
    - c. Street railway shop and car house men as in Section II-5-d-5
    - d. Street railway way and structures employees as in Section II-5-d-6
    - e. Truck drivers in other industries
    - f. Retail grocery clerks
    - g. Federal employees
    - h. Skilled mechanics
    - i. Carpenters
    - j. Bricklayers

G. M. "There is a trinity in business the parties to which must be kept in proper relation to each other. It comprises the customer, the employee and the owner. Any unbalanced condition here results in hardship for those at a disadvantage."

IV. *Service Requirements for the Public*
1. Discussion of public needs in way of betterments, attention to deferred maintenance items, etc.
2. Detailed lists of principal items and estimated amounted required for each item segregated between rolling stock, track, overhead lines, power, buildings, etc.

S. T. "The next subdivision you assigned me, Chief, is a hard one—'Ability to Pay.' Labor, as a general proposition, maintains that this is a matter that should not be injected into wage demands. The new claim that the company's ability to pay is up to the company, that this is a condition that must be met by the company and not the men."

G. M. "In some other businesses this contention might be true, but we have our income fixed for us without regard to our expenses, so the argument does not hold. The men would have a good reason to object to this matter being included in our presentation if they could prove that we are not paying a living wage now; in which event we would have to seek relief or else back the cars into the car houses and quit. Any business that cannot pay its men a reasonable compensation is economically water-logged and should be allowed to sink."

S. T. "It seems to me that there is a moral obligation on the part of the company to the public that the arbitrators cannot lose sight of. If they hand down an award that will require fares away in excess of reason or what the public will pay, then their work will go for naught and will have to be done over, always assuming that the men are being paid above a living wage."

V. *Ability of the Company to Pay.*

1. Income and expense statement
   - a. For past year
   - b. For current year
   - c. Forecast for the ensuing year
2. Investment and valuation figures
3. Discussion of depreciation; need for providing for extraordinary renewals out of earnings
4. Efficiency in operation; charts showing—
   - a. Comparison of operating costs on a car-mile and car-hour basis with other cities of similar size
   - b. Comparison of operating ratios reduced to an equivalent basis with other cities of similar size
5. Discussion presenting arguments sustaining the contention that, under the circumstances and restrictions and regulations under which the company operates, the arbitrators must give proper weight in their deliberations to the item "Ability of the Company to Pay."

G. M. "This discussion is all right, Jim, unless it is found that the wages being paid are so low that they do not provide a living for the employee, in which case at least a living wage should be awarded and the company take the necessary steps to meet the award."

S. T. "Some of the men talk an eight-hour day. There is no doubt that in some classes of work an eight-hour day is proper and necessary. But I am convinced that our men don't want eight hours work and no more. What they want is a basic eight-hour day and plenty of overtime at one and one-half times their regular rate. Under the next subdivision this matter should be thoroughly discussed and each argument already advanced, and any we can anticipate, answered."

VI. *Justice of a Shorter Working Day.*

1. Discussion of the occupation of the street railway man from a health standpoint.
2. Detailed run-assignment chart showing—
   - a. Regular runs
   - b. Regular daily extras
   - c. Trailers
   - d. Scheduled hours of various types of runs
   - e. Actual hours worked on various types of runs
   - f. Elapsed time on various types of runs
3. Discussion of shorter working day from an increased production standpoint.
4. Discussion of the shorter working day as a means of securing additional compensation at a high hourly rate.
5. A fair working day in train service.

S. T. "In this next section we should work up a résumé of the situation and draw attention clearly, concisely and without bias to the major matter involved. If general dissatisfaction and discontent have been present, let's tell the arbitrators about it. On the other hand, if a few agitators are making all the thunder and are receiving half-hearted support from our men, let's frankly say so."

G. M. "In other words, Jim, we should attempt to prove that harmonious relations have been the usual thing on this property and by presenting a history of events leading up to the demand for increased wages bring this point out. All right, let's see how you have covered this."

VII. *Chronology of Events Leading Up to the Present Wage Arbitration.*

1. Copy of contract with employees
2. Discussion of contracts
3. Regulatory situation; attitude of utility commission and city government
4. Brief summary of other wage awards and reasons therefor
5. General discussion on rates of fare and wage rates and possibilities of increasing both

G. M. "Well, as a starter, Jim, that outline will keep some of us busy around here for a week or so. There is no doubt that when we get into the job of working up detail, a lot of other ideas will pop up. Now, whom shall we put on the job?"

S. T. "If you'll let me handle the detail and you put the finishing touches to the completed report, I'll apportion this program to various heads of departments and follow them up. First, I'd suggest a round-table meeting at which you go over the details and tell the crowd the whys and wherefores."

G. M. "We'll meet here tomorrow morning at nine o'clock."

Changes in Living Costs

THE following tables show the cost of living in eight cities in the United States in December, 1919. Table I, which gives the percentage that each group of items bears to the total in December, 1920, indicates that food was the cheapest in Seattle, clothing in Baltimore, rents in Philadelphia, fuel and light in Cleveland and furniture and furnishings in New York. The miscellaneous group is less in Detroit.

TABLE I—PER CENT OF TOTAL EXPENDITURES

	Baltimore	Cleveland	Chicago	Detroit	New York	Philadelphia	San Francisco and Oakland	Seattle
Food	42.0	35.6	37.8	35.2	42.0	40.2	37.9	33.5
Clothing	15.1	16.0	16.0	16.6	16.6	16.3	16.6	15.8
Housing	14.0	16.4	14.9	17.5	14.3	13.2	14.8	15.4
Fuel and light	5.0	4.1	6.0	6.3	4.3	5.1	4.1	5.4
Furniture and furnishings	4.3	6.0	4.4	5.9	3.3	4.4	4.2	5.1
Miscellaneous	19.7	21.8	20.6	18.3	18.7	20.8	22.4	24.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

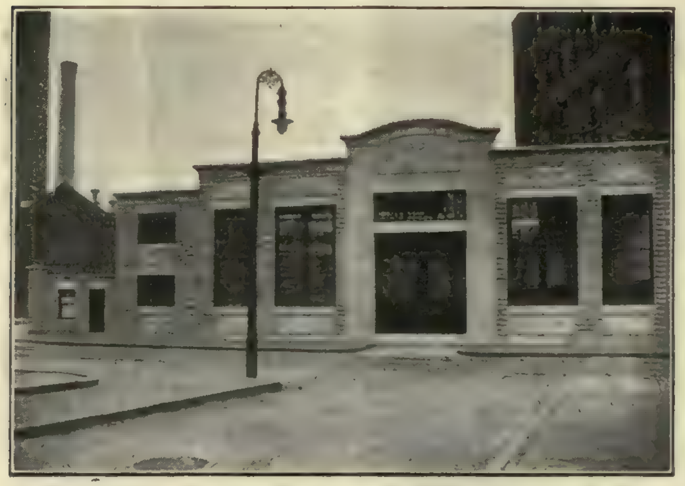
Table II shows how the total cost of living has changed in various cities from December, 1914. An analysis of the table indicates San Francisco and Oakland to be the cheapest places in which to live, with Chicago, Seattle, Baltimore, Philadelphia, New York, Cleveland and Detroit following in the order named.

TABLE II—PERCENTAGE CHANGE IN LIVING COST FROM DECEMBER, 1914

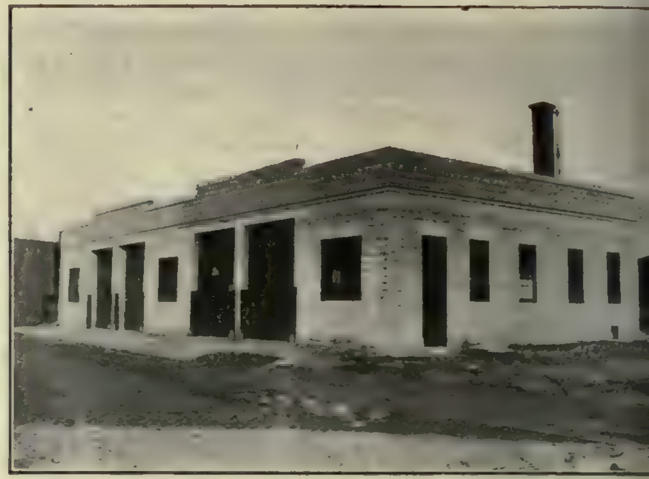
	Baltimore	Cleveland	Chicago	Detroit	New York	Philadelphia	San Francisco and Oakland	Seattle
December, 1915	*1.4*	1.4	3.0	3.5	2.0	1.2	*1.7*	*1.0*
December, 1916	18.5	19.1	19.5	22.3	14.9	14.7	8.3	7.4
December, 1917	51.3	42.9	41.8	49.9	44.7	43.8	28.6	31.1
December, 1918	84.7	71.4	72.2	78.0	77.3	73.9	57.8	69.9
June, 1919	84.0	77.2	74.5	84.4	79.2	76.2	65.6	76.9
December, 1919	98.4	95.1	100.6	107.9	103.8	96.5	87.8	97.7
June, 1920	114.3	116.8	114.6	136.0	119.2	113.5	96.0	110.5
December, 1920	96.8	104.0	93.3	118.6	101.4	100.7	85.1	94.1

Italics indicate a decrease; roman numbers indicate an increase.

The information contained in these tables was prepared and issued as Bulletin 961 by the United States Department of Labor, Bureau of Labor Statistics, Washington.

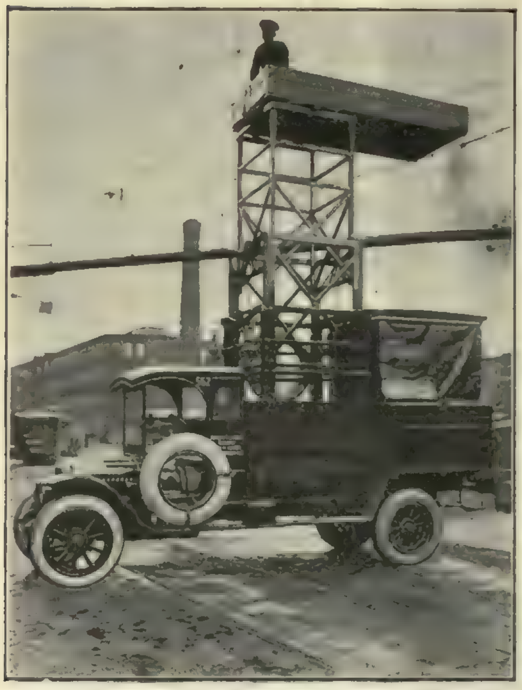


GENERAL APPEARANCE OF CENTRAL GARAGE ON HARRISON AVENUE

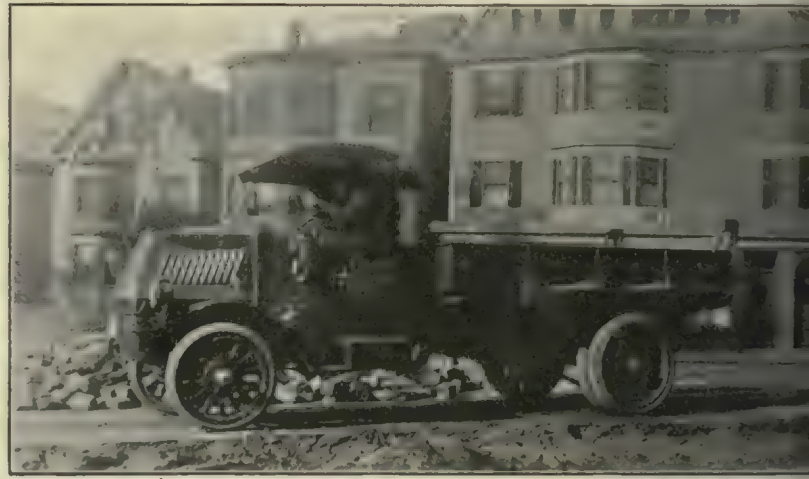


OUTSIDE VIEW OF TYPICAL SUBSTATION GARAGE A SULLIVAN SQUARE, CHARLESTOWN

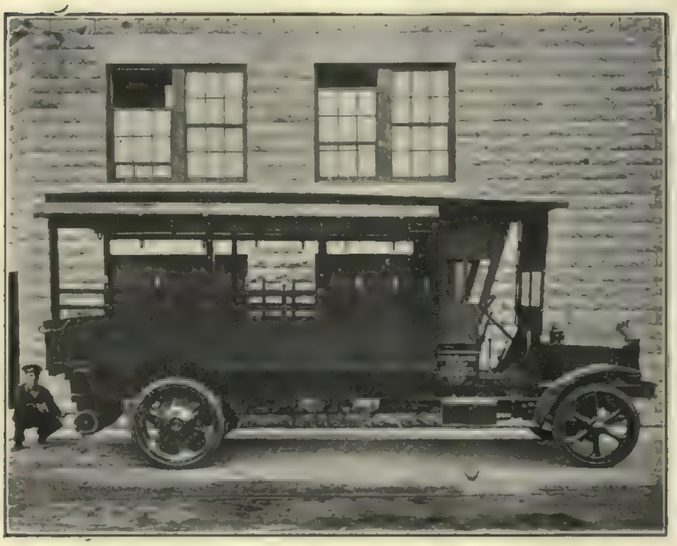
Illustrations of Typical Garage Buildings and Automotive Service Equipment in Use by the Boston Elevated Railway



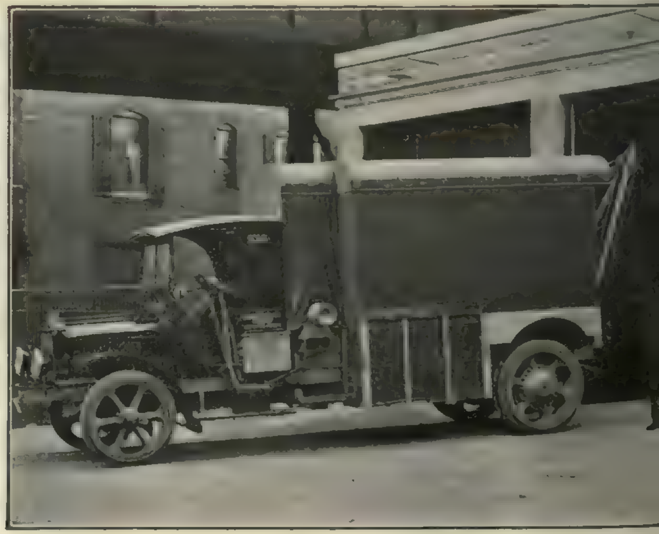
WHITE TYPE OF MOTOR-DRIVEN EMERGENCY TOWER WAGON



FIVE-TON MACK DUMP TRUCK USED BY TRACK DEPARTMENT



WHITE TYPE OF HEAVY LINE WORK TRUCK WITH WINCH AT REAR



WHITE TYPE OF WRECKING TRUCK WITH A 7-TON DERRICK

Replacing Horses with Motors and Trucks

The Boston Elevated Railway Saves 25 per Cent in the Operating Cost of Emergency and Trouble Wagons—Purchases Thirty-two Trucks and Builds New Garages—The New Motor Equipment Is so Located as to Be Able to Reach Scenes of Trouble with a Minimum of Delay

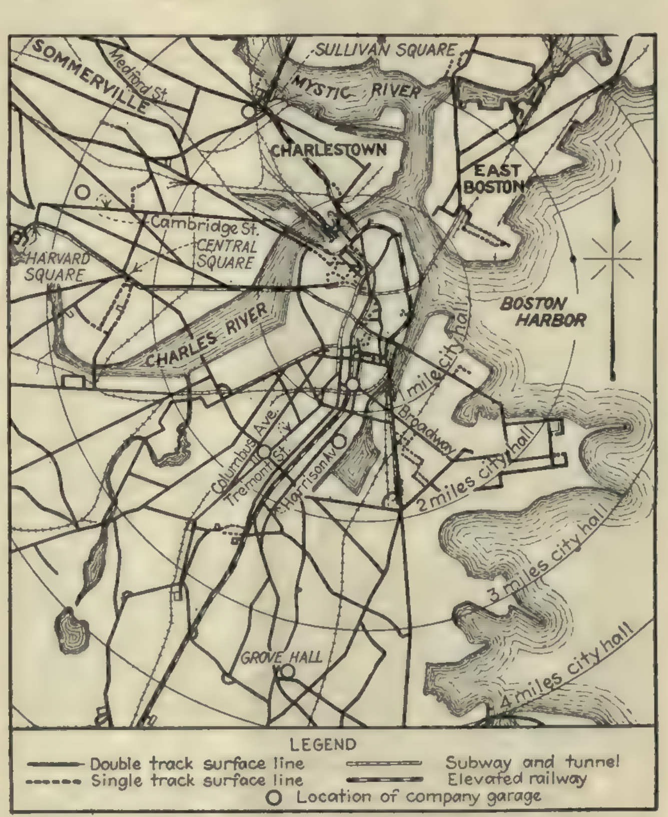
BY EDWARD DANA
General Manager Boston Elevated Railway, Boston, Mass.

DURING the year 1920 the Boston Elevated Railway made substantial progress in replacing horse with motor vehicles in the interest of economy and efficiency. Thirty-two motor vehicles with a total capacity of 25 tons were purchased at a cost of approximately $138,000. The 5-ton trucks were of the Mack type and the balance White trucks. A list follows:

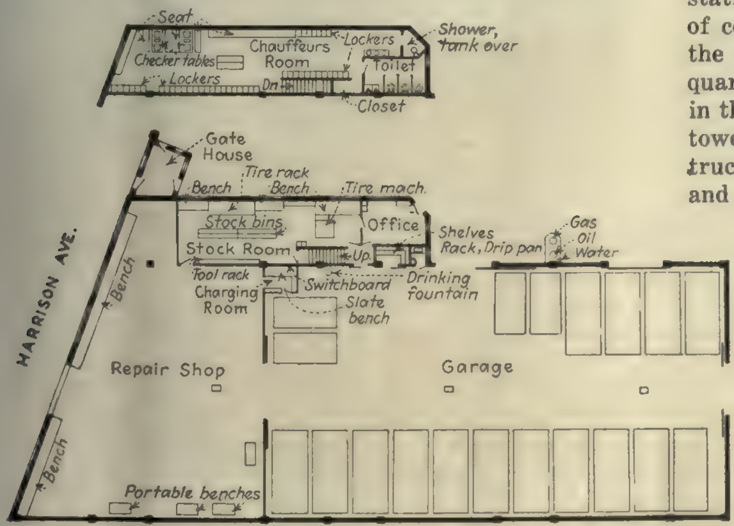
Five 5 -ton dump trucks.
Three 3½-ton wrecking trucks.
Two 3½-ton platform trucks.
One 3½-ton wire department truck.
Nine 2- ton tower trucks.
Two 2 -ton platform trucks.
Two 2 -ton covered express trucks.
One 2 -ton army body truck.
Four ¾-ton express trucks.
Three ¾-ton switch repair trucks.

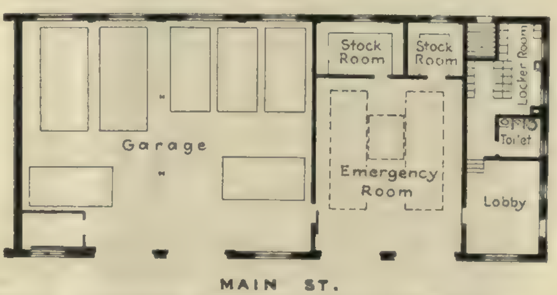
In order to accommodate such a fleet of motor vehicles it was necessary to provide garage facilities. Five modern fireproof buildings were constructed and a section of an existing brick building was also partitioned off as a garage. The construction of these accommodations called for an expenditure of $198,000.

These buildings were located, as shown on the map, at Harrison Avenue, Broadway, Grove Hall-Roxbury, Sullivan Square, Camden Street and Baldwin Street, Cambridge. The central garage, having a storage capacity of forty cars, was located at Harrison Avenue, at which point is located the headquarters of the wire and conduit division and the company's present machine shop. This garage is of modern construction throughout, built of concrete blocks and equipped with repair shop, storeroom and chauffeurs' quarters. The general arrangement is shown on the floor plan. The type of construction is also illustrated. The floor plan and an outside view of the Charlestown Station, a typical so-called substation garage, are also shown. Except for the storage of certain trucks these substation garages are used for the emergency line service and wrecking truck headquarters. The most important types of trucks are shown in the accompanying illustrations and are the emergency tower wagon, heavy line work truck with winch, wreck truck equipped with derrick capable of lifting 7 tons, and 5-ton trucks for construction work in the depart-



MAP OF BOSTON ELEVATED RAILWAY, CENTRAL DISTRICT, SHOWING LOCATION OF GARAGES WITH RESPECT TO LOCATION IN THE HEART OF THE SYSTEM





AT LEFT, FLOOR PLAN OF CENTRAL GARAGE, 552 HARRISON AVENUE. AT RIGHT, FLOOR PLAN OF TYPICAL SUBSTATION GARAGE IN CHARLESTOWN

TABLE I—SCHEDULE 3337-R—LIST OF TOOLS CARRIED ON WRECKING WAGONS—BOSTON ELEVATED RAILWAY

Axe	One
Bars	One 60-in. crow
Bars	Two 60-in. pinch
Bars	One 30-in. cutting
Bars	One 30-in. pinch
Bolts	One of each size motor and gear case bolts
Bolts	One motor eyebolt
Bolts	½-in. M bolts assortment 2 in. to 8 in. long
Bolts	⅝-in. M bolts assortment 2 in. to 8 in. long
Bolts	¾-in. M bolts assortment 2 in. to 8 in. long
Bolt cutter	1¼ in.
Blocking	Four 6x6 in. x 2 ft.
Blocking	Four 4x6 in. x 2 ft.
Blocking	Four 2x6 in. x 2 ft.
Blocking	Four 1x6 in. x 2 ft.
Blocking	Two 3x8 in. x 2 ft.
Blocking	Two 2x4 in. x 6 ft.
Blocking	Two 2x4 in. x 12 ft.
Blocking	Two 4x4 in. x 12 ft.
Blocking	Two 4x6 in. x 12 ft.
Blocking	Two 6x6 in. x 12 ft.
Blocking	One hardwood cut for broken axle
Couplings	Two drawbar couplings for each type of car
Chains	2¼ in. x 6 ft. with ring and grab hook
Chains	1¼ in. x 12 ft. with ring and grab hook
Chains	2¼ in. x 10 ft. with ring and grab hook
Chains	2¼ in. x 6 ft. with ring and grab hook
Chains	1¼ in. x 5 ft. with ring and grab hook
Chains	1¾ in. drag chain
Chisels	2¼ in. old chisels
Chisels	One blacksmith's cold chisel
Connectors	Three No. 6 two-way and three No. 4 two-way
Drawbar	One extension
Drag rope	2¼-in. wire, 25 ft. long
Flashlight	One large size
Fuses	For all types of cars
Gloves	One pair rubber gloves
Grease	One 5-lb. can of cup grease
Hammers	One hand-hammer 2½ lb.
Hammers	One sledge-hammer 10 lb.
Hawkes device	One for broken wagon axles
Hoist	One 2,000-lb. Harrington
Jacks	Two 15-ton Simplex or quick-acting jacks
Jacks	Two 15-ton and two Simplex No. 310 adjustable base
Jacks	Two 25-ton Norton self-lowering
Lamp	One extension lamp
Lantern	Two inspectors to be maintained ready for service a all times
Nails	One assortment of various sizes
Oil can	One squirt can filled with oil
Planks	One 2x8 in. x 8 ft.
Planks	One 4x8 in. x 8 ft.
Pliers	One pair gas pliers
Pliers	One pair cutting pliers
Picks	One
Pins	One assortment of all sizes of cotter pins
Plates	Three ¾x6x15 in. steel
Punches, drift	Three, assorted sizes
Punches, drift	One blacksmith's ¾ in.
Replacers	Four Tilden car replacers
Rope falls	One with double blocks and 400 ft. 1-in. rope
Rope slings	Two 1-in. rope, 4 ft. long
Snatch block	One for 1-in. rope
Saw	One hand saw—crosscut
Shovels	Two
Screwdrivers	One each 6-in., 12-in., 18-in.
Tripod	One
Tape	One roll
Twine	100 ft. heavy twine
Trolley wheel	One
Trolley wheel spindle	One of each type
Trolley cord	One
Trolley wire pick-up	One
Truck	One for broken wagon axles, to be hung over wreckin wagon with rope falls and dropped onto wagon whe responding to calls for broken-down teams
Truck	One four-wheel truck for broken-down autos
Timber	One 6x8 in. x 10 ft. to be kept near wrecking wagon an taken when call indicates serious car wrecks
Waste	5-lb. clean cotton waste
Washers	Assortment 1½-in. down
Wheel skid	One cradle for broken wheels and axles
Wire	20-ft. No. 6 wire
Wood pry bar	One 10-ft. long
Wrenches	One fork, 1¼x1⅛ in.
Wrenches	One fork, 1x⅞-in.
Wrenches	One fork, ¾x⅝ in.
Wrenches	One fork, ⅝x½ in.
Wrenches, monkey	Two each 6 in., 10 in., 14 in., 18 in.
Wrenches, stilson	One each 14 in., 24 in.

ment of maintenance-of-way. The remaining trucks are of various sizes for transportation of material and supplies.

In addition to economy in the handling of supplies the most important feature is the time saved in handling wire breaks or wrecks which interfere with the operation of the cars. These emergency trucks are so located that the entire system can be easily protected and the proper truck landed at the location of the trouble with a minimum of delay.

The wrecking facilities previously had consisted of old 20-ft. cars equipped with wrecking material, but as these cars could not get close to the scene of trouble they were awkward and inefficient, and while still available in extreme emergency they will rarely if ever be pressed into service. The previous methods were described in the ELECTRIC RAILWAY JOURNAL of May 23, 1914.

The accompanying Table I shows the equipment carried on three large White wrecking trucks, previously illustrated.

The foreman in charge of the trucks is held absolutely responsible for knowing that such tools and equipment are on the wrecking wagons at all times and is held strictly accountable for any negligence i the checking up of the tools after the trucks have been out on duty.

A summary of the complete provision for handling wrecks or other track obstructions on the surface lines is given in Table II. Practically all of this work is now handled by the auto trucks, and the former single-truck trolley wrecking cars are maintained for extreme emergency use only.

By the use of these auto trucks in their present locations it has been possible to reduce the number of men in the wire emergency service from fifty-one to forty-four. The use of the motor-driven vehicles has made it possible to dispose of a large number of vehicles and forty-five horses and to abandon four stables previously used.

These changes alone have made an approximate saving of $85,000 a year in maintenance expenses, equivalent to about 25 per cent on the investment in auto trucks and housing facilities. It has also resulted in a material improvement in the physical condition of the horse-drawn equipment because the horses and vehicles which were selected for disposal were those in the poorest condition.

TABLE II—LOCATION OF WRECKING STATIONS, EQUIPMENT IN EACH AND FORCE NEEDED TO MAN WRECKING TOOLS AND EQUIPMENT—BOSTON ELEVATED RAILWAY

Location	Type of Wrecking Car or Truck	Wrecking Tools and Equipment	Wrecking Force
Broadway wrecking station	Auto truck	Complete equipment as per schedule 3337-R	Three shifts: two men each: foreman and repairman
Charlestown Neck wrecking station	Auto truck	Complete equipment as per schedule 3337-R	Two shifts by truck driver-repairman (6 a.m. to 12 midnight). Wrecking crew from carhouse.
Grove Hall wrecking station	Auto truck	Complete equipment as per schedule 3337-R	Two shifts by truck driver-repairman (6 a.m. to 12 midnight). Wrecking crew from carhouse.
Park Street	20-ft. box car	Complete equipment as per schedule 3336-R	From carhouse force—available all hours.
Milton	20-ft. box car	Partial equipment	From carhouse force—available all hours.
North Point	20-ft. box car	Complete equipment as per schedule 3336-R	From carhouse force—available all hours.
Jamaica Plain	25-ft. box car	Complete equipment as per schedule 3336-R	From carhouse force—available all hours.
Amory Street	20-ft. box car	Partial equipment	From carhouse force—available all hours.
Reservoir	25-ft. box car	Complete equipment as per schedule 3336-R	From carhouse force—available all hours.
Watertown	20-ft. box car	Complete equipment as per schedule 3336-R	From carhouse force—available all hours.
East Boston	20-ft. box car	Complete equipment as per schedule 3336-R	From carhouse force—available all hours.
Bennett Street	25-ft. box car	Complete equipment as per schedule 3336-R	From carhouse force—available all hours.
Salem Street	25-ft. box car	Complete equipment as per schedule 3336-R	From carhouse force—available all hours.
Everett	20-ft. box car	Partial equipment	From carhouse force—available all hours.
Clarendon Hill	20-ft. box car	Complete equipment as per schedule 3336-R	From carhouse force—available all hours.

This Is the Fourth of a Series of Articles on the Report of the Federal Electric Railways Commission, Written by a Commissioner

The Report from a Financial Standpoint

Suggestions Made as to Clauses Which Must Be Provided in Service-at-Cost Franchises to Commend Them to Investors—Adjustment of Capitalization to Value Discussed—Re-establishment of Credit a Long Process and Accomplished Only as the Average Investor Becomes Reassured of Essential Character of Business Done and Willingness of the Public to Permit a Fair Return

By CHARLES W. BEALL
Vice-President Harris, Forbes & Company, New York

TWO recommendations of the Federal Electric Railways Commission seem to have attracted more criticism than any of the others. One is the reference to the service-at-cost franchises. The other is that no satisfactory solution of the electric railway problem can be made which does not include a fair valuation of the property employed in the public service and the statement that where this is done the company should voluntarily reduce any excessive capitalization to the basis of such value.

SERVICE-AT-COST NOT OBLIGATORY

Service-at-cost, it should be explained, is not urged upon the companies for immediate adoption. In fact, the report says definitely that such contracts are in the experimental stage, but the commission found hat where these contracts have been tried they seem to have secured a fair return upon capital, estabished credit and effected reasonably satisfactory public service, and the commission believes that such conracts may be safely entered into where the public right eventually to acquire the property is safeguarded.

In my opinion service-at-cost is the most practical system of relation beween the city and the company which has yet been offered, but it is not perfect, and as experience with it s continued undoubtedly the plan will be improved in detail. To be satisfactory every service-at-cost plan ought to be an indeterminate permit, and if limited in time the rate of fare and the earnings permitted should be sufficient during the ife of the franchise to amortize the nvestment, and there should be a clause providing for a renewal of the franchise in case the investment is not amortized.

Every service-at-cost plan should also provide sufficient funds to take care of any temporary lack of earnings arising when there is a change from a low fare to a higher fare, and also a proper fund to provide for depreciation and obsolescence of the property. These funds should be provided either out of the income allowed to be earned on the property, or if the original amount of such funds is furnished by outside capital and charged to capital account and represented by securities such funds should be included in the value of the property on which the company is allowed to earn a proper income. Very few service-at-cost plans provide funds of this account in sufficient amount. In some cases the amount so reserved is a specified sum, but it is much better to have this sum bear some definite relation to the earnings, the size of the property and the service performed. Otherwise, with an expanding system, the fund would decrease in its relation to the property.

Another point upon which question has been raised in connection with service-at-cost franchises is whether it is desirable to provide an incentive to the company to give service at the lowest possible cost. In some of the later franchises an attempt has been made to provide for this by means of a sliding scale of return, varying with the rate of fare, a higher percentage of return being permitted on the admitted value of the property when the lower scales of fare are in force. While none of these attempted incentives to economy on the part of the company has been entirely satisfactory, undoubtedly progress has been made toward the solution of this problem.

One definite fact has been determined in regard to service-at-cost franchises. From the standpoint of interesting the investor it is fatal to fix a maximum rate of fare. The future is always shrouded in uncertainty and conditions unforeseen at the time that the franchise was drafted may arise which would make any fixed maximum rate unprofitable for the company.

ADJUSTMENT OF CAPITALIZATION TO VALUE

The second point mentioned above, the adjustment of the capitalization to accord with the value of the property, is undoubtedly desirable for both the company and the public. This does not mean, however, that it can always be done. It is easy to see that legal difficulties may often arise, especially with companies having a large number of security holders and many classes of securities. If the corporate organization of the company is simple and the security holders few the plan is much more easy of accomplishment. The proportion of assenting security holders necessary to carry out such a plan depends upon the laws of individual states.

ERRORS IN FINANCING

The report mentions a number of errors in the early financing of the electric railway properties which contributed to bring about their present plight. These errors had their foundation largely in an exaggerated belief held in the early days of the profits of electric railways and resulted in failure fully to care for depreciation or amortize obsolescence, and in some cases the payment of unearned dividends. During these days extensions were built which economically had no right to exist.

These were undoubtedly serious financial errors, but much can be said in extenuation of the companies.

In the first place, during the early years of electric railway operation neither the management nor the public realized the rapid improvement and changes in the art nor the wear and tear of equipment which would take place in electric railroading. In consequence they did not understand the large amount which would be required for obsolescence and depreciation. Obviously the public profited by these mistakes because the fares charged were insufficient to pay for the service. Later, as the facts became evident and costs increased while fares remained stationary, efforts on the part of the companies to secure increased compensation were denied. It is only recently that authorities have begun to pay attention to the outstanding needs of the companies. It is safe to say that now no electric railway company can sell its securities unless it has such a rate of return as to cover these charges and pay a fair return on its capitalization.

The electric railway situation at present is in the anomalous position of being an essential utility unable to finance its expansion to keep pace with the development of the community which it serves. As the population of a city grows the demands for urban transportation increase in even greater ratio, but as the capital investment required for this expansion varies between $3 and $6 for each increase of $1 in gross receipts it is obvious that the railway cannot finance its growth without outside help. Yet there has been practically no new financing of electric railways in Wall Street for a long time other than those instances of railways combined with electric lighting and power companies.

The re-establishment of credit will be a long process and it can be accomplished only as the average investor becomes reassured of the essential character of the business done and the willingness of the public to permit the company to earn a fair return. Even then the rate which the company will have to pay for money will be comparatively at least as high as that demanded for other forms of investment.

San Francisco's Municipal Railway

Before Pacific Railway Club, M. M. O'Shaughnessy, the Engineer of the City, Traces the Development and Outlines the Problems of the Local Civic System

ON FEB. 9, 1921, M. M. O'Shaughnessy, city engineer of San Francisco, Cal., addressed the Pacific Railway Club on the local transit situation, with particular reference to the city-owned and operated lines, which he said were the only municipally owned lines in the United States which are operating successfully. Some of his remarks are summarized below.

The people of San Francisco, in the charter of 1900, declared for public ownership of public utilities, the difficulty of successful competitive operation of the railway lines having proved a dominating reason for the decision to dispense with private ownership. After three elections $2,000,000 in bonds were voted for the Geary Street electrification in 1909, but little work was done in the following two years. The speaker's connection with the enterprise began Sept. 1, 1912. The road was opened for operation on Dec. 28, 1912, from Kearny Street as far west as Thirty-third Avenue and to Golden Gate Park. It was gradually extended until in July, 1913, the Geary Street cars were able to go clear to the ferry and out to the ocean. San Francisco then rested on its achievements in municipal ownership until 1914, when the problem of transportation for the Panama-Pacific Exposition came up.

As the United Railroads' franchises were soon to expire the private company was not inclined to make further investments and the task devolved upon the city. Its engineering department attacked the problem and designed an improved type of car which was a ton lighter than the earlier cars and saved the city $125,000 on 125 cars. Construction on Van Ness Avenue was started in the spring of 1914 and the line to the Exposition was completed in five months. The municipal lines, with the help given by the United Railroads, handled the Exposition crowds without discomfort. Out of the $3,500,000 bond issue voted Aug. 26, 1913, three other lines were built, one on California Street to Lincoln Park, another on Potrero Avenue to Twenty-fifth Street and the third to Church Street in the Mission. In 1915 the completion of the Church Street line was proceeded with, after considerable controversy as to route and other details. Next the problem was to get down to Market Street to carry the people home. After considerable litigation with the United Railroads the right of the city to build tracks wherever it chose on the streets was established and the Church Street line was finally continued to the ferry.

The next extension was out Market Street through the Twin Peaks tunnel, which was 12,000 ft. long, had cost $4,000,000 and had been constructed to give rapid transit to residents beyond Twin Peaks. This tunnel had been a possibility because the people beyond the hill were willing to pay an assessment of $3,000,000, or $1,000 per acre, to get direct transportation between the city and their homes. Although a logical solution of the problem would have been to allow the United Railroad to route cars through the tunnel, the people opposed this and the Municipal Railway lines were extended at a cost of $300,000. At first this was a profitless extension, but it is now paying operating expenses.

As to the objection to four tracks on Market Street, if these were not there a subway would be necessary, at a cost (for a two-track subway) of $12,000,000 for the three miles of the street.

Mr. O'Shaughnessy said in conclusion that the Municipal Railway is on a sound financial basis. Since operations were started in 1913 gross revenues have amounted to $15,078,000 and operating expenditures $9,561,000. From the beginning the total disbursements have been $12,895,000. Interest amounting to $1,642,000 has been paid out of earnings. Of the $5,500,000 in bonds issued $899,300 has been redeemed and extensions and betterments have been made, including 27 miles beyond the original 45 miles, at a cost of $1,188,150. Fourteen per cent of gross receipts is set aside for depreciation and 4 per cent for damages and accidents.

The most harmonious relations exist between the city's operating department and the United Railroads in the way of crossings and other matters. San Francisco is now well supplied with railways, of which 288 miles belong to the United Railroads, 62 miles to the city and 10 miles to the California Street Cable Line. This is a mile of track to each 14,000 people. The combined earnings are $12,100,000 per year, which is a large total for a city of 39,000 acres area and 508,000 population.

"Selling" the Safety Car in Madison

Standard One-Man Cars Were Tried, to Which the Public Took a Dislike, and They Were Replaced by Double-Door Cars, Whereby Public Approval Was Gained—Results that Were Obtained Justify the Use of This Type of Car for This Service

DURING the war the Madison (Wis.) Railway purchased and placed in operation five standard one-man safety cars, in order to try out this type equipment as a means of improving the service ren- red and at the same time to take advantage of the onomies thus made available. They were in operation many months and gave satisfactory service except the fact that there s manifest a dis- ct public dislike for e little cars, a dis- e which seemed to nter in the criticism, plied particularly to e rush-hour conges- n, that it was nec- sary for boarding ssengers to await e exit of leaving pas- ngers before they uld get on, and that e narrow aisle made difficult to pass pas- ngers standing in e aisle, and hence ey would refuse to back in the car to ke room at the en- nce. A glance back the equipment used Madison up to this time may serve to explain these ticisms of the riding public. Due to the location of the y on a long, narrow strip of land lying between Lakes mona and Mendota, giving the city an 8-mile length, th the business district located at about the center of the Madison Railway enjoys a volume of patronage usual for a city of but 40,000 population. Of this, more n half is carried on the cars each day. Unlike most npanies operating in the smaller cities, this one had er made the mistake of going to the large, heavy ble-truck type of car. So the advent of the safety car sented no appearance of tending back to former ctices—a poorly founded criticism that has often n heard in other cities. But while accustomed to gle-truck cars, Madison people had been educated to louble-end two-man car with rear entrance and front t, closed vestibules, roomy platforms, 28-in. aisle l generous seat dimensions and spacing. The seating acity of these cars was thirty-two and their weight 500 lb. Their design was the result of a number of rs of study and observation on the part of F. W. l Dudley Montgomery, respectively president and e-president and operating heads of the property. ese cars proved so eminently satisfactory to both the npany and the patrons that it was only natural, later when the safety car was the subject of special study, t an effort should be made to incorporate some of the irable features of this car into the new one-man car.

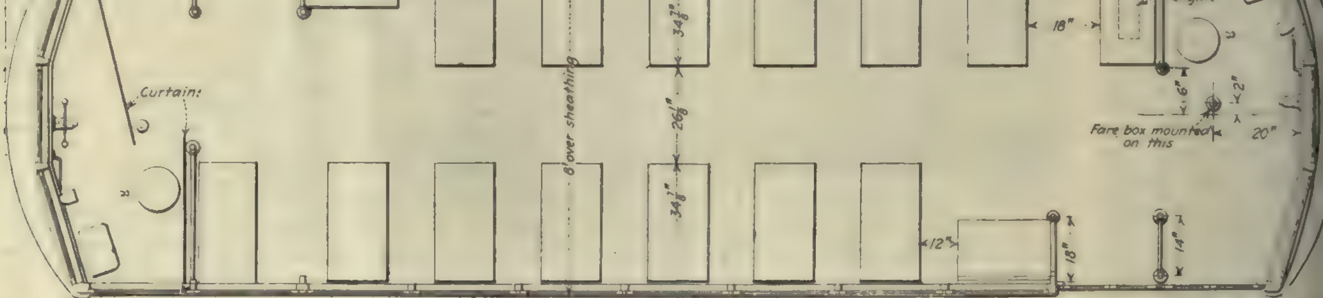
SIMULTANEOUS LOADING AND UNLOADING OF SAFETY CARS IN MADISON, WIS.

The situation was brought to a head in 1919 when the company asked authority of the Wisconsin Railroad Commission to purchase fifteen additional standard safety cars. The Madison City Council thereupon voted eighteen to one against the installation of any more cars of this type, and the commission refused to grant the request. So the company set out to see what could be done toward producing a car that would be acceptable to the public and still retain as many of the features of the standard safety car as possible. In other words, it was the aim to get a design of car manufactured that could be "sold" to the public of Madison as well as to the company. After unsuccessful negotiation with one or two car builders, Dudley Montgomery went to Philadelphia and finally induced the J. G. Brill Company to accommodate him by building eight safety cars according to his specifications. The accompanying floor plan shows the principal dimensions and layout of the cars built. The main points in which the Madison car departs from the standard safety car are that it is 2 ft. 3½ in. longer; 4 in. wider over the side sills, which is utilized to give an aisle 4 in. wider; a separate exit and entrance passageway, each 24½ in. wide, instead of one door 30 in. wide; that it weighs approximately 2,600 lb. more than the original safety cars used in Madison which are similarly equipped and finished, and involves a cost of approximately $600 per car in excess of the then price of the standard car. The exact scale weights on the eight cars upon receipt in Madison on Sept. 1, 1920, were 17,085 lb., 17,165 lb., 17,145 lb., 17,205 lb., 17,105 lb., 17,125 lb., 17,125 lb., and 17,100 lb., to which a slight amount has since been added on account of the exchange of the form-fit springless seats for cushion seats, so that the average weight will now run very close to 17,200 lb. A relative idea of the principal dimensions of the Madison car as compared with those of the standard Birney type of car is readily gleaned from the following data:

	Madison Car	Standard Car
Length over all	30 ft. 1 in.	27 ft. 9½ in.
Length over corner posts	16 ft. 10¼ in.	17 ft. 9½ in.
Length of platform	5 ft. 11 in.	4 ft. 4¼ in.
Width over side girder plates	8 ft. 0 in.	7 ft. 8 in.
Width of aisle	26 in.	22 in.
Door opening (clear)	24½ in. (two)	30 in.
Seating capacity	31	32

Aside from these few differences in body design, the Madison car in other respects is the standard car, except for what slight strengthening was necessary in the structural design of the body to provide for the additional width and length. The truck is the standard Brill 79-E type without a change, and the motors are the G. E. 264 type. In other words, Mr. Montgomery adhered to the standard design just as far as was possible and incorporated the double door and wider aisle. He reports that no motor trouble whatever has developed in the first five months of service because of the heavier load carried.

A particular feature claimed for the layout of the car is that the wider aisle and large amount of standing room at the rear induces people to move back in the car and avoids the front end congestion, which seems to have been one of the principal difficulties with the standard car in Madison. As the result of long observation, Mr. Montgomery is satisfied that a 26-in. clear aisle is the minimum that can be used and still secure a not uncomfortable passing of riders in the aisle. This new car will readily handle a standing load equal to the seated load and do it just as expeditiously as the former standard-type single-truck car operated by two men. Mr. Montgomery says that if the safety car is loaded beyond this amount, that is, beyond sixty people, there is a slowing up, and it can be noticed that the two-man roomier car, under such heavy overload conditions, will handle the crowd a little faster.



FLOOR PLAN OF THE DOUBLE-DOOR ONE-MAN SAFETY CAR BUILT FOR MADISON, WIS., AND LANCASTER, PA.

Certain other features have been included in these latest Madison cars which evidence Mr. Montgomery's ideas. He is very strongly of the opinion that the number of moving parts or fixtures in a car should be kept to the absolute minimum. Consequently, there are no folding seats in the vestibules; there is a permanently mounted operator's stool at each end, the one at the rear being often used by passengers; there are no curtains for side windows; the four ventilators are made with a fixed opening, with no adjustment, leaving no chance for trainmen to close the ventilator. The arrangement of the operator's curtains is also unique, consisting of two roll curtains located as seen in the floor plan of the car. The cars are built with double floors, Agasote side sheathing but no headlining (because Mr. Montgomery contends that this neither improves the heating nor muffles the noise) and Renitent patented brass side posts on account of the wind-proof fit of the windows and the ease of raising and lowering which he attributes to them.

The cars are equipped with twelve heater units, but these are not quite adequate, and a vestibule heater at each end is to be added. The average winter te perature in Madison is 27 deg. F. The aim is to p vide heat enough at this outside temperature to g a car temperature of 50 or 51 deg. The trolley bric is 16 in. higher than on the standard car and a pole 1 longer is used. This combination is said to give bet results in keeping the wheel on the wire on account the smaller angle between pole and wire thus obtaini which is effective in preventing jumping at points high wire. Still another idea incorporated into t Madison car was the provision against freezing of t air system under the rather severe climatic conditi encountered. An unusual amount of cooling pipe, tot ing 24 ft. to the wet tank and 30 ft. between this a the dry tank, was installed under the car floor. T running of the piping inside the car was thus avoi with apparent success, judging from the operating perience of the first winter.

The entrance and exit doors on the Madison cars a connected to the same door engine and operate sim taneously, as on the standard car. On four cars of t same design put through the Brill plant at the sa time as the Madison cars for use in Lancaster, Pa., ho ever, separate door engines were installed to opera the exit doors and controlled by a separate air va placed within easy reach of the operator.

Operating Results Very Satisfactory

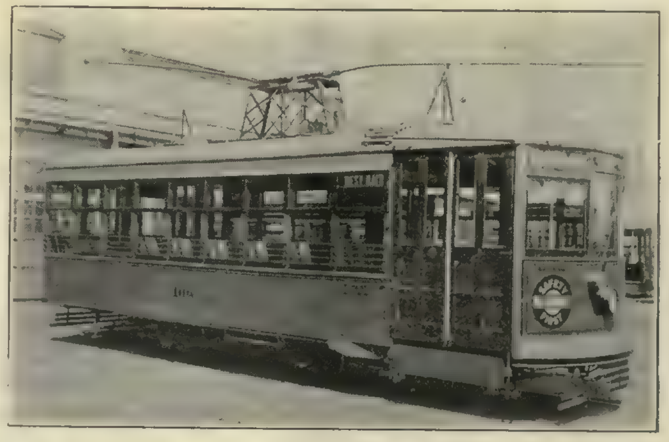
As to the operating results obtained with the doub door cars, the Madison operating officials are v enthusiastic. In matter of first consideration, the pu lic has not only not criticised these new one-man safe cars with the double doors and wider aisles, but h given plenty of evidence of being pleased with the A frequent comment made has been to question why t company did not get cars like these in the first pla the five standard cars having been disposed of by s to another company when delivery of the others w made. There has also been manifest an appreciation the evidence that the company had tried to give t people what they wanted.

The rush-hour period, of course, affords the b opportunity to observe the merit of the design. Wh a car pulls up to a corner on the State House Squa and there is a group of twenty to thirty people waiti to board the car, it is noticeable how quickly the int change of leaving and boarding passengers is co pleted and the car again on its way. Immediately up the opening of the doors, the ingress of passeng begins through the forward or right-hand door, sim taneously with the egress of passengers through t eft-hand passageway. The operator is thus busy colecting fares while the egress of passengers is taking lace instead of standing idle during this period. As oon as all leaving passengers have alighted, the reaining boarding passengers get on at both entrance nd exit. Those boarding at the exit door reach over nd drop their fare in the box, if they have a ticket or xact change ready, and the speed of service is just that uch ahead. Otherwise, they wait until the operator an give them change. No effort is made to prevent oarding at the exit door. Passengers are simply given e advantage of the extra space, and Mr. Montgomery ays that the loss of fares from people slipping by without paying is so slight that it may be forgotten altoether. At least the loss attributable to the separate xit and entrance is so slight as compared to the benefits hat it is worth little consideration. Passengers enterg at the exit side must pass so close to the operator hat he is easily able to control, reasonably well, any ttempt at free riding. The speed of loading in Madion is also facilitated by a very general use of metal okens, which sell at nine for 50 cents, while the cash are is 6 cents.

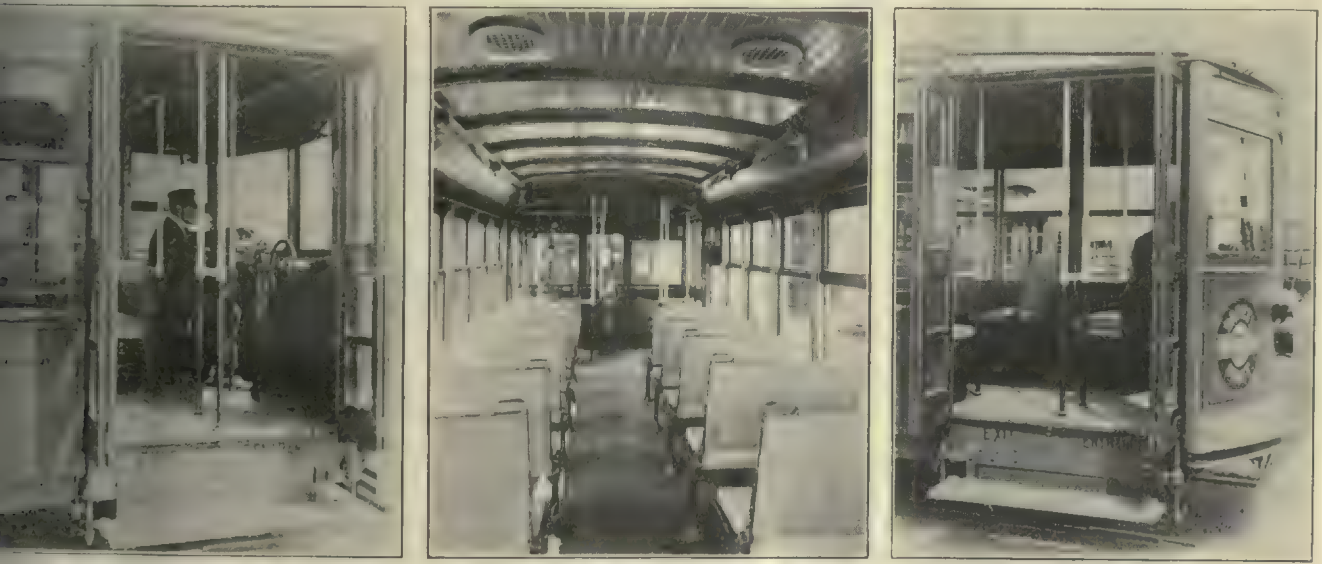
DETAILS OF MADISON OPERATION

After the seats are filled, the generous amount of tanding room at the rear of the car attracts the tandees back there, so that the front well and aisle are ept open longer, and even when capacity load is eached, Mr. Montgomery points out, the 4-in. extra idth in the aisle and the extra well space at the front ake the task of getting through the standees from a oint back in the car in order to get off a much easier e than was experienced with the 22-in. aisle cars. his fact is not without appreciation on the part of the ublic, for while people may not know that there is in. more in the aisle, they do know that for some eason it is not so hard to get through the crowd in ese cars when they wish to alight as it was in the rmer ones.

Thus, the two principal criticisms mentioned in the rst paragraph are seemingly met and this may explain e favorable reception accorded the latest addition to e rolling stock of the Madison Railway. This is the answer to the problem with which the officials have had to deal and explains their enthusiastic indorsement of this particular design of one-man safety car.


THE 17,200-LB. MADISON SAFETY CAR, SHOWING SEPARATE EXIT AND ENTRANCE AND HIGH BRIDGE FOR TROLLEY MOUNTING

Just a brief summary of the service given in Madison may help in visualizing the conditions under which the safety cars are operated. They are not severe, in comparison with the requirements faced by many companies. The total system comprises three lines operating over 18 miles of track. All lines extend through the business district, at the center of which is the State Capitol, and into the residential district in both directions. All cars operate over the single-track loop around the State House Square, passing around a portion of the loop in one direction and the remainder on the return trip. The day schedule calls for nineteen cars, and six extra cars are used in the morning run and thirteen extra in the evening. The convergence of all three lines at the square gives a five-minute headway all day over this track, with a closer spacing in rush hours. The one-man cars are operated on any of the lines and interspersed with the two-man cars. Both the standard safety cars and double-door safety cars were installed in Madison on a car-for-car basis in replacing the two-man cars. The headway on all lines is ten minutes, both for two-man and one-man cars.


AT LEFT AND RIGHT, FRONT PLATFORM LAYOUT, SHOWING THE ARRANGEMENT OF STANCHIONS AND POSITION OF OPERATOR RELATIVE TO EXIT PASSAGEWAY. IN CENTER, INTERIOR OF MADISON CAR, SHOWING ABSENCE OF FOLDING PLATFORM SEATS, CURTAINS AND OTHER MOVABLE FIXTURES

A Symposium on Traffic

Sales Methods Must Be Followed to Increase Traffic, but They Must Be Accompanied by Good Service Through Close Co-operation Between the Transportation Department and the Traffic Department, so that the Public Will Be Satisfied with What It Buys—The Subject Is Considered from Four Standpoints

THE greater part of the session on Friday morning, Feb. 25, of the Toledo meeting of the Central Electric Railway Association was devoted to the subject of "Traffic." Four papers on this topic were presented, and there was also oral discussion. Abstracts of these four papers follow:

The Functions of a Traffic Department

BY BERT WEEDON
Traffic Manager Interstate Public Service Company, Indianapolis, Ind.

ONE of the greatest problems of the world has been traffic and transportation. This problem is yet far from being permanently solved, even with the new methods of transportation being perfected. One of the definitions of the word "traffic" is the business of transportation, as by railroad. It is this phase with which we have to do.

Years of experiment and study have developed highly efficient traffic departments in the transportation companies of this country. Commercial and manufacturing concerns, realizing the value, are also creating traffic departments of their own. The successful traffic man of this day must not only be a "hale fellow well met" but a diplomat, and have a fairly good working knowledge of commercial and transportation law.

The traffic manager of a railroad is the sales manager of that railroad. He is the man who meets the public, the newspapers and the various civic organizations in his territory. He has but one commodity to sell—service. His success depends, first, on his ability as a salesman to sell; second, the quality of the service to be sold; third, the amount he has to sell. He must know his competitors' service as well as his own. He must know that the price of his service is right, or in keeping with the quality of service offered. The public, on whom we depend to buy our service, does not question price as closely as it does the quality of the service.

The success of the traffic man depends on what he is given to sell. Among his many duties is a thorough study of the local situation, its requirements as to transportation service, its relation to the territory reached through connections, and the ability to serve, not only local territory but the region reached by connections.

A thorough study must also be made of operating costs to make rates in keeping with the cost of service maintained. It is an easy matter to build up gross earnings, but if the costs are 90 per cent to handle the business is it good judgment to solicit this class of business?

For the past three years all transportation companies have had all they could care for in all departments of service. We are now returning to a more normal basis and are up against the keenest competition of our lives. Our service must be of the best if we expect to get our share.

One phase of competition at present is the automobile truck as a common carrier. Many theoretical solutions have been offered, but few are of value. Good common horse sense is of the most use.

If the necessary electric railway transportation service to the welfare of a community is rendered and legislation enacted to require truck operators to help maintain the highways used and also to comply with carrier laws, as their electric railway competitors are required to do, there would be little trouble with this class of competition.

Then, too, the traffic and the transportation departments must co-operate to meet competitive service. The principal phases of our business today are passenger and freight transportation. Are we getting all the business along these lines that it is possible to secure?

MORE EFFICIENT SERVICE NEEDED

It would seem that rates and fares have reached their maximum. If so we must increase our volume of passengers and tonnage handled. This can best be done by more intensive development of existing lines in the way of more efficient service that gives: (1) Through passenger trains to more distant points on maintained schedules. A thorough study relative to the establishment of limited, local and suburban trains, to meet the requirements of the territory served. (2) Establishment of efficient local and through freight service package cars to more distant points. Establishment of carload commodity rates with especial solicitation of carload traffic.

Another phase of our business necessary for real success is publicity. Tell the public what is being done for its welfare, and why. Let it know the troubles, and why. Certain things it wants done cannot be done Tell it why.

As a public servant we have a moral duty to perform The welfare of the territory we serve is of vast importance and we should be interested in its development in so far as the law permits.

There was a time when a carrier corporation was a hated monster. That time has changed. The public is beginning to think those who have to do with the operation of a carrier company are almost human. Advantage should be taken of such a psychological moment. Publicity should be used to cultivate our patrons. Clear, clean-cut statements of facts concerning the business should educate and enlighten them and eliminate at least a major portion of any antagonistic feeling.

Adverse criticism and antagonism is largely due to ignorance. The American public is fair, and once our problems are known as we know them it will be quick to meet us half way in solving them. Co-operation and co-ordination of all departments means success for all departments. It also means that when the traffic department functions properly there will be black figures on the balance sheet.

Traffic from an Operating Viewpoint

By L. M. Brown

Superintendent Transportation Interstate Public Service Company

THERE is an evident lack of co-operation between departments when the traffic department agrees to furnish a service which the operating department cannot or does not perform. Such things have been known actually to occur, and if such a shortsighted policy is pursued it will seriously interfere with the reputation and business of any railroad.

To the operating department is assigned the duty of furnishing the service. The traffic department, no matter how competent, cannot succeed unless the operating department can deliver the goods. To give good service trains must be kept on schedule time, operated by employees who are competent and courteous and operated safely. To do this the necessary equipment must be provided. This equipment, together with the roadway and track and power equipment, must be kept in first-class operating condition and the operation must be supervised by some one who is capable of doing the right thing when emergencies arise. Personal attention must also be given by operating men in providing extra sections or trail cars for regular trains on days of heavy traffic.

Management Must Have the Confidence of Employees to Make Boosters of Them

The traffic manager and the operating man have to deal with a great number of complaints. If these are handled diplomatically and properly corrected friends can be made and the service improved. Most men are reasonable and fair when conditions are explained to them in the right way. The greatest available organization of boosters for any public utility is its own employees, and if the management is made up of men who have the complete confidence of the employees every man is a traffic man or a salesman and a booster for the company he represents.

Traffic men and operating men should be active in the civic bodies in the communities they serve. The value of the personal touch and contact with the leading men of a community is not only of great importance from a public relations standpoint but numerous ideas can be gained for increasing the business and for the betterment of the service.

I agree with the opinion that rates have reached their maximum and that as business returns to a normal basis we are facing keener competition than ever before. This means that the electric railway service must be improved if the interurbans are to get their portion of the business. Out of Indianapolis are now a number of fast limited electric trains. They render a real service, and the establishment of others to more distant points would no doubt attract additional passengers. Chair cars, dining cars and sleepers have been installed on some lines. There is no doubt that the short-haul riders are becoming fewer on interurban lines, due principally to the increased number of automobiles, and the best chances for increasing the passenger revenue seems to be in providing more limited or through trains, with every convenience and comfort provided on the steam lines.

With freight service the clamor now is for quick delivery. People like to buy one day and receive the shipment the morning following. Freight schedules must necessarily be revised to meet new conditions. If the road is large enough there should be local and through freight trains. The necessary equipment should be secured for the handling of large shipments and commodity rates established which will increase the car load business. Where freight stations are congested it may sometimes be possible to have shipments loaded directly in the car and changes or improvements made in schedules.

If we strive to give such service that the traveler will say when he travels, 'Let's go by traction; they are always on time," or when he ships his freight he will specify traction because they give the best service, the balance sheet will be satisfactory and the troubles of the traffic man and the operating man greatly relieved.

The Need for Personal Effort

By F. D. Norviel

General Passenger and Freight Agent Union Traction Company of Indiana

"TRANSPORTATION sales department" is a proper term for the traffic department of any electric line and one which is becoming very commonly used. The transportation salesman of a railroad is frequently not allowed the broad scope of initiative that makes for success in the industrial salesman, yet the commodity handled by him is probably one of the most important and necessary articles for the success of the business world.

If we had no competition the making of price marks and the display of our goods for sale could be handled from a clerical department, but unfortunately at the present time the electric lines are faced with probably the strongest competition ever encountered in the history of that service, and it means more than ever before the exploitation of the service that the company has to sell and a greater effort on the part of each individual department.

Auto Truck Competition Must Be Met by Decisions from a Study of Patrons' Wants

Observation has led me to conclude that rates can go no higher than they now are without a serious curtailment of traffic. There are two reasons for this: One is that other transportation means, such as the motor truck, giving a pick up and delivery service at rates lower than those now offered by the rail carriers, and another is the fact that the dollar is becoming more valuable and people are now counting pennies and nickels where they were thinking of quarters and half dollars just a short time ago.

Too much thought cannot be given to meeting the competition which we now have. The steam roads, with their immense and varied facilities, are very active. And then there is the motor truck, which is, in my opinion, our greatest competitor for the class of l.c.l. freight on which the electric lines have built up the considerable freight traffic they now haul. Thus the traffic man cannot confine himself to the office but must go out and meet his patrons face to face, study their wants and needs and endeavor to make the service he has to sell fit these conditions. He must gain the confidence of his prospective customers by making sure that his customers receive a satisfactory transportation service. This accomplished, the people and the industries will be offered to him in so far as his ability to serve has been perfected.

How to Increase Ticket Sales

By J. H. Crall

General Passenger and Freight Agent Terre Haute, Indianapolis & Eastern Traction Company

THE question of encouraging the purchase of tickets at stations instead of paying cash fares to conductors is a question undoubtedly worthy of consideration. This matter has been discussed by the Traffic Association at various times, but no concerted action has been taken to devise some method whereby we may get the money through the ticket windows and into the hands of the ticket agent. I believe there are several methods whereby we may successfully reduce the collection of cash fares on trains and increase the sale of tickets:

First, this may be done by penalizing the passenger 10 cents for each collection made by the conductor, as is done by the steam roads. This might be done by refunding the passenger this excess charge at any ticket office upon surrender of a cash fare receipt, but the plan to increase the sale of tickets would be more effective if the carrier would retain the excess charge. Such a method would be subject to the approval of the public service commission.

Second, a slight reduction may be made in the rate for a round trip. This plan is in effect on some of the interurban lines; the deduction is a certain per cent or a certain amount, usually 5 per cent or 5 cents for amounts from 25 cents to 50 cents and 10 cents for all amounts over 50 cents.

Third, another way of increasing the ticket sales is to appeal to the civic pride of the town served by the railroad. Most municipalities are apt to refer to the amount of business done by the railroad in their own town as a criterion of the prosperity of their community. I believe the traffic man should co-operate with the town boards and civic and commercial organizations in a campaign to encourage the purchase of tickets. A little advertising in the local papers and an attractive sign over the ticket agent's window reading "Boost Your Home Town by Buying Tickets," or "Buy Tickets Before Boarding Car," will help. And then do not fail to get your agent enthused, and see that he takes a pride in increasing the ticket sales and inject a little "pep" into the agent by showing that you have some yourself and you are sure to get results.

Super-Power Plant Plan for Indiana

FREDERICK L. RAY, superintendent of power plants Union Traction Company of Indiana, Anderson, Ind., recently read a paper before the Indiana Engineering Society in Indianapolis in which he outlined in a broad way the possibilities for economy and convervation of coal which would result from an abandonment of the nineteen small and largely inefficient power plants now operating in central Indiana and the building in their stead of two large modern power stations located at points of immediate coal and water supply and connected with the territory by high-tension lines. His estimate was that this would easily make a saving of nearly 50,000 tons of coal per month, or $150,000 per month. In a table presenting the operating efficiencies of the nineteen plants in this district, it was shown that the most efficient plant consumed coal at the rate of 3.20 lb. per kilowatt-hour, while the other plants ranged above this up to 9.66 lb. The proposed location for both power plants is on the Wabash River along the western boundary of the State, one north of Terre Haute in Vigo County and the other south of Terre Haute in Sullivan County, both of which are in the vicinity of the Indiana coal mines. A loop transmission system extending across the State would transmit the power generated at these plants to the entire central portion of Indiana.

Combination Storage Battery and Trolley Locomotive

TWO new type combination storage battery and trolley locomotives, made at the Erie plant of the General Electric Company, have been added recently to the equipment of the yard transportation department of the company at Schenectady. The new locomotives, which will be operated from a storage battery except in emergency cases, weigh 30 tons each and are the heaviest yet designed for the 36-in. narrow gage track. They are equipped with four HM-819, 250-volt motors. Braking is done with air, supplied by a motor driven air compressor of 16 cu.ft. per minute displacement. Air also operates the sander, bell and whistle. By the throw of a switch in the cab the locomotive is converted from a trolley to a storage battery type, drawing its power from a 96-cell, type MV-25 plate Exide-Ironclad battery.

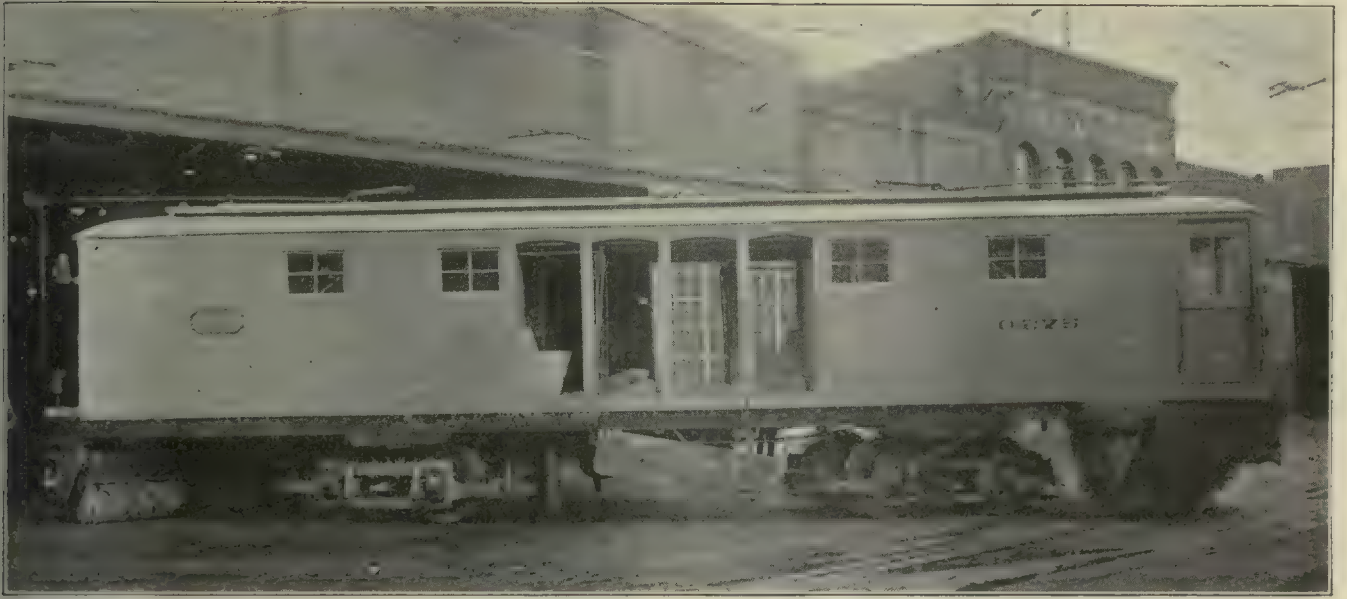
NEW TYPE COMBINATION STORAGE BATTERY AND TROLLEY LOCOMOTIVE FOR YARD TRANSPORTATION AT THE SCHENECTADY WORKS OF THE GENERAL ELECTRIC COMPANY

A big advantage of these locomotives over the straight trolley type is to be found in entering a building wired only to the door. With the old type it has been necessary to run a rope into the shop and attach it to the car or to place a hook with a lead onto the trolley wire and thus have a dangling wire supply the power while the locomotive goes inside. The storage battery type eliminates all this procedure and can operate anywhere the narrow gage tracks are to be found. A mechanical feature is the demountable steel tire. When the tire wears out eight bolts and a ring are removed, the old tire is taken off and a new one replaced.

In the illustration also can be seen a new type dump car being used. It carries standardized parts which eliminate the necessity for a large supply of special parts in making replacements or repairs, and had a 10-yd. capacity as compared with 4 yd. of the smaller type used. The new flat cars have a capacity of 100,000 lb. as compared with 10 tons of the older variety. This makes it possible to move any material manufactured or used within the plant.

Open Cars Changed to Snow Sweepers

The Connecticut Company Has Designed and Constructed in Its Own Shop Eight Sweepers from Obsolete Open Cars — Trouble Incident to Chain-Drive Sweepers Eliminated by Use of Gear Drive—Use of Old Material and Equipment Results in Low Cost



EIGHT OF THESE ON THE CONNECTICUT COMPANY'S LINES MAKE SHORT WORK OF SNOW REMOVAL

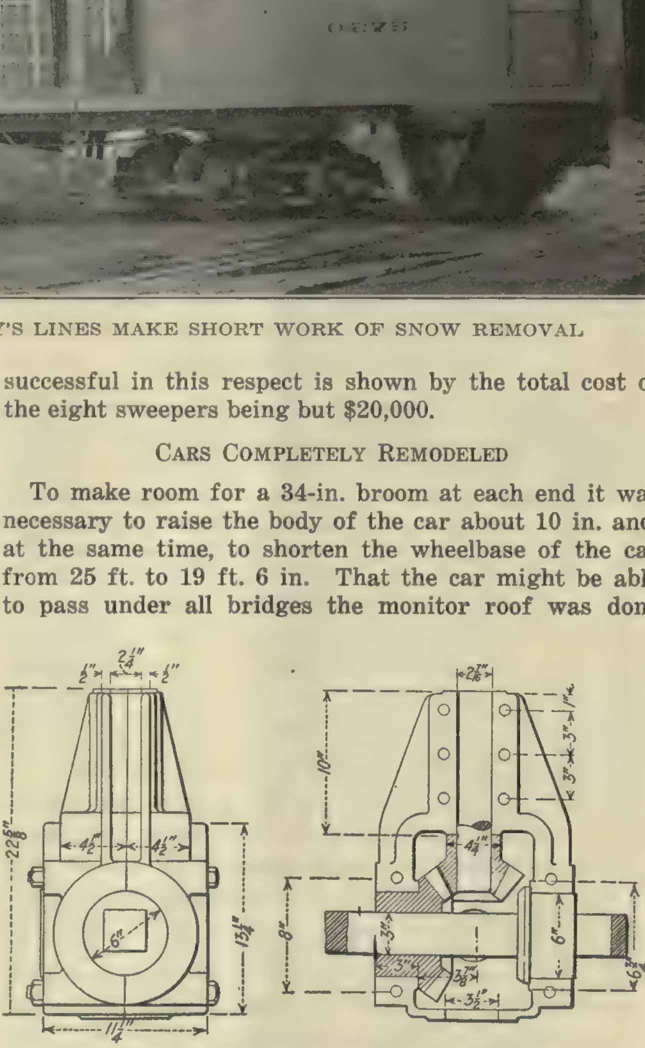
THE Connecticut Company has recently added to its snow-fighting equipment eight double-end rotary snow sweepers which were designed by its own engineers and constructed in its own shops at New Haven. Traffic delays following snowstorms have emphasized the necessity for equipment which would make short work of clearing the tracks, and the trouble experienced with chain-drive sweepers demanded that a more reliable construction be designed. The result has been that a very rugged, powerful and dependable sweeper has been produced. It is expected that these sweepers will be able to clear the tracks of light snow up to 12 in. in depth. For snows heavier than this, of course, a plow will be used, which, if need be, can be followed by a sweeper to complete the cleaning of the tracks.

At the present time sweepers have been allocated to the various parts of the Connecticut Company's system as follows: Three in New Haven, two in Hartford, two in Waterbury and one in Bridgeport.

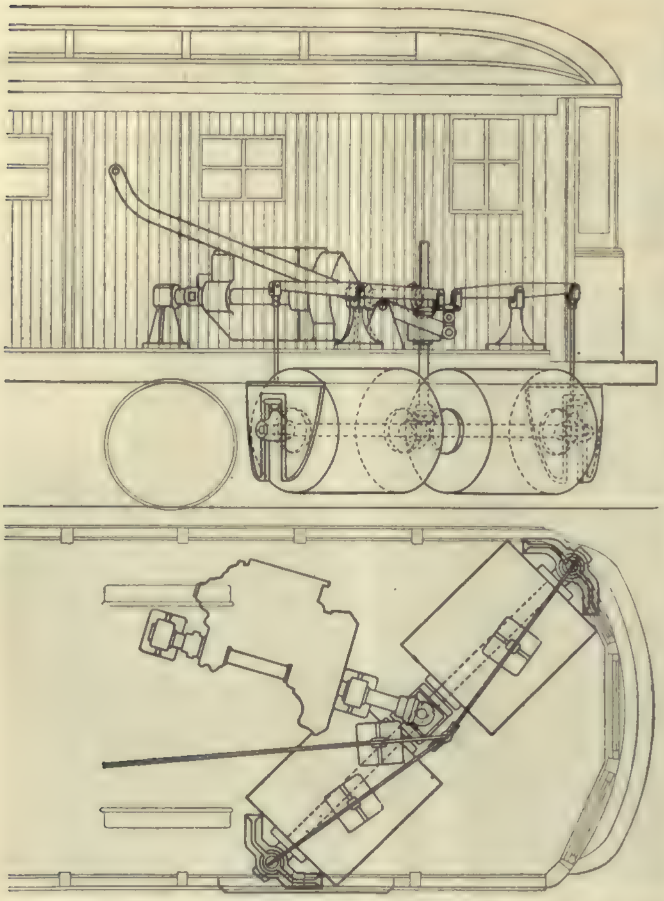
In order to utilize as much as possible the old equipment available, it was decided completely to rebuild eight double-truck, fifteen-bench open cars which survived their usefulness for passenger service. All of the cars were equipped with Brill 27-G trucks; seven of the cars had GE-67, 40-hp. motors with K-6 controllers and one car had GE-80, 45-hp. motors with K-35 controllers. Each piece of this equipment was thoroughly overhauled before being put in service again. All of the brooms are driven by GE-67 motors except one, which is driven by a Westinghouse-101 motor. K-10 controllers are used for the broom motors. All of these motors were also overhauled, some of them having been through a fire. Wherever possible use was made of old material in order to keep the cost to a minimum, and that they were successful in this respect is shown by the total cost of the eight sweepers being but $20,000.

CARS COMPLETELY REMODELED

To make room for a 34-in. broom at each end it was necessary to raise the body of the car about 10 in. and, at the same time, to shorten the wheelbase of the car from 25 ft. to 19 ft. 6 in. That the car might be able to pass under all bridges the monitor roof was done away with, which decreased overhead clearance by 10 in. The shortened wheelbase gives a long overhang and has made it impossible for the car to pass another on a curve. Both bulkheads have been removed and the ends totally inclosed. A space in the center corresponding to that formerly taken by four benches has been left open so that snow-fighting equipment and materials such as shovels, salt, etc., can be easily loaded and transported.



DETAILS OF BROOM SHAFT DRIVE JOURNALS



AN OUTLINE DIAGRAM SHOWING THE LAYOUT OF THE SWEEPER INSTALLATION

To strengthen the overhanging ends not only have the sills been strengthened but also an overtruss has been added on each side. Each truss is composed of a ¾-in. by 4-in. steel bar running between two queen posts over the bolsters and this strip is connected at each end with a 1-in. steel rod which goes through the ends of the sills. Also all stanchions have been strengthened by the addition of a wooden strip on each side.

Since plenty of space was available within the inclosed portion of the car all auxilliaries except the brake cylinder are removed from the under side of the car and are installed inside. This additional protection does its little bit to help eliminate any chance of failure and is quite essential because of the severe conditions to which everything beneath the car in proximity with a fastly revolving broom is subjected. The air compressor is placed in one corner on the floor; above it on a shelf is the governor, and above that strapped to the roof is the air reservoir. The grid resistors for the car motors are arranged in the corresponding corner of the other end in a vertical position and inclosed to prevent any one accidentally coming in contact with them. All wiring except the leads to the car motors is run along the roofs of the cars and thus protected from all injury.

BROOM-DRIVE CONSTRUCTION

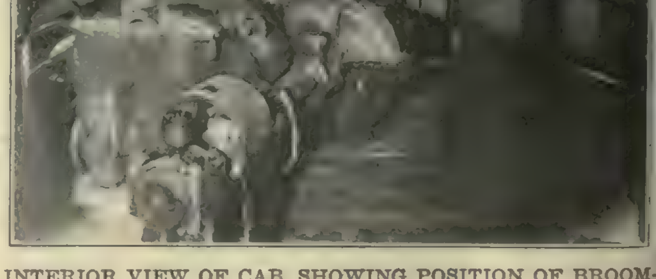
The rattan broom, which is at an angle of 45 deg. with the axis of the car, is supported from two jaws or pedestals. The one nearer the truck is supported from the car body, but the other one, which extends slightly beyond the end of the car, is supported by a channel iron running back into the car about 5 ft. and bolted through to the sill. These jaws act as a guide for the bearings at each end of the broom shaft. Except where the broom shaft enters the journals at the ends it is square and, accordingly, the broom itself is made in four sections and strapped to the shaft.

Now comes the novel part of this design. Instead of having a sprocket on the broom shaft and a chain running back into the car, the broom is driven through bevel gears from a vertical shaft. These gears are entirely inclosed by a cast-iron housing which acts as a case to hold the gears in line. The bevel gear on the broom shaft is made with a collar, which, with a similar collar on the other side of the housing, furnishes the bearing in the housing. On each end of the shaft next to the outside bearing is a thrust washer to take up the force acting along the shaft. The broom shaft is made from forged steel containing from 0.25 to 0.30 per cent carbon. A long bearing in the top of the housing supports the vertical shaft and the gear is held in line on the bottom by a collar on the gear itself and on the top by another collar. This housing is made tight and is completely packed with grease.

The broom motor, through bevel gears in a similar housing within the car, drives the vertical shaft, which is splined to allow the broom to be raised and lowered. Rods screwed into the broom shaft journals and connected within the car to a system of levers furnish the means for raising and lowering the broom. The working of this is shown in the accompanying cut. As originally designed, the two pedestals seen were lower and the toggle connecting the two levers was above instead of below the raising levers. This arrangement was found unsatisfactory, for when an attempt was made to raise the brooms by lifting up on the handle the toggle buckled. By placing a pin through holes in a V-shaped yoke in which the control lever works the broom can be held adjusted to any desired height.

The motor is supported by two pedestals, in which the shaft corresponding to the axle runs. The motor is held at the back by two smaller pedestals. In case it is found necessary to overhaul this motor it is necessary only to remove the bolts from the two rear pedestals and to turn the motor over on the driving shaft. A gear ratio of 22 to 62 is used. The broom runs at the same speed as the axle shaft, since the gear ratio of the upper bevel is 27 to 18 and that of the lower 18 to 27.

Obviously a very accurate control of the broom motor



INTERIOR VIEW OF CAB, SHOWING POSITION OF BROOM-DRIVE MOTOR, CONTROL, RESISTORS, ETC.

is desired so that it can be regulated according to the depth of snow and the speed of the car. This means that every point on the controller must be a running point. Instead of installing a great deal of capacity in resistors, a very simple method was resorted to. Discarded and wornout carbon brushes from car motors were packed into a fiber conduit tube about 3 in. in diameter and about 4 ft. long. Connection is made through a copper plate at each end, the upper held against the brushes by a spring. Six of these units are arranged vertically along the side of the car opposite the motorman. The controller for the broom motor is placed in the forward end of the car so that the operator has a good view of the roadway ahead.

CARBON-PILE RESISTORS MADE FROM OLD MOTOR BRUSHES

Up to the present time there has not been a real snowstorm which would test these sweepers to their capacity. However, during a recent light fall of snow one sweeper in New Haven was operated continuously from 10 a.m. to 6 p.m. and performed in a perfectly satisfactory manner. The track and a space 10 in. on each side were swept clean of both snow and sand. It is felt by the designers that ample power has been provided for the brooms, and if there is any limiting feature it is the broom itself.

The car is equipped with wings on both sides which can clear the roadway on either side of the car. Each is controlled by a block and tackle, the rope extending into the inclosed part of the car, so the wings can be easily drawn in to make room for passing vehicles and other cars. Sand boxes are provided in both ends of the car with a 3-in. pipe leading to the rail. There is also a salt box in each side in the open space so that no salt will be brought into contact with any of the equipment. Aprons extend down over the front of the car about half the diameter of the broom to prevent the snow from flying in the air too far. That some such precaution is warranted can easily be seen, when it is realized that the speed of the broom is about 350 r.p.m. Every effort has been exerted to have these sweepers as reliable and powerful as possible, for, like fire-fighting apparatus, when they are needed they are needed badly.

The machining of new parts and the overhauling of both the broom and car motors were done in the reclamation shops, while the rebuilding, painting, wiring and installation of the brooms and their driving motors were done in the Grand Avenue repair shops in New Haven, Conn.

The first order of eleven electric locomotives for the Swedish State Railways has recently been placed with the Motala-Lindholm works. These locomotives, to be delivered in 1922, will be used to haul iron ore on the Lulea-Gelivare line.

Association News

Shortage in Accounts Discovered

IN THE audit which was begun last week of the accounts of the American Electric Railway Association for the fiscal year of the association the auditors found some discrepancies in the accounts of William O. Gibson, bookkeeper, and President Gadsden was notified. A special meeting of the executive committee was called by Mr. Gadsden on Tuesday morning of this week, and on Wednesday Gibson was arrested. The audit is said to reveal irregularities in excess of $40,000, of which about one-fifth was in Liberty Bonds and the rest in cash. The alleged misappropriation occurred since the last audit. When Gibson was arraigned in court Mr. Gadsden said that he had made a confession. The particular charge against him was that on Jan. 18, 1921, he cashed an association voucher at the Guaranty Trust Company, stating that it was to pay an efficiency expert in the Washington office, when actually there was no such employee.

To aid in determining the extent of the discrepancy, all members of the association are being asked to advise the association of the date and amount of any remittances made for dues since November, 1919.

An adjourned meeting of the executive committee has been called by President Gadsden for March 15.

Out to Meet the Public

THE advertising section of the Bureau of Information and Service of the association has already begun to function in accordance with the platform adopted at the Chicago conference. It is now engaged in the preparation of publicity copy for use in selling the suggestions in the report of the Federal Electric Railways Commission to the public in the communities served by the trolley lines. Two cards have been sent out to member companies; one, 8⅝ x 13⅛ in., displays a summary of the principal findings and recommendations of the commission, and is intended for display in public places, such as waiting rooms, carhouses, office windows and the like. The other is a desk card 4½ x 8½ in., which sets forth the remedies suggested by the commission for the betterment of conditions.

Loss of Creosote by Evaporation

THE amount of creosote lost through evaporation in open-tank treatments has been shown in experiments at the United States Forest Products Laboratory to be in proportion to the area of the exposed surface and the volatility of the oil.

Percentage of Oil Distilling Below 270 Deg. C.	Loss in Pounds per Square Foot per Day
20	1.0
30	1.4
40	2.0
50	3.0
60	4.3
70	6.3
80	9.3

At the treating temperature of 195 deg. F. the loss of creosote in pounds per day per square foot is as shown in the accompanying table.

Recent Happenings in Great Britain

Inquiry Into Tramway Wages Under Way—Through Bookings for Tramway and Omnibus in London

From Our Regular Correspondent

Much interest attaches to the inquiry which began in the end of January regarding the claim of the tramway employees of the country for an advance in wages of 12s. a week. It is the first inquiry of the sort which has taken place in connection with the industry, and whatever other result it may have it will elicit all the facts on both sides and make them public.

IN PREVIOUS articles I have traced the course of the dispute, in which the employers took up and adhered to the position that they could not pay more, as the industry was already run at a loss. Then the Minister of Labor constituted this Court of Inquiry under the industrial courts act, 1919, with instructions to inquire into the causes and circumstances of the dispute and to report thereon to the Minister. The court is composed of representatives of employers and employed and two outside members. What will happen after it has reported remains to be seen.

MEN'S CASE HEARD FIRST

At the hearings, which began on Jan. 26, parties were represented by prominent men in their own ranks, not by counsel. The case for the employees was taken first and lasted for several days. E. Bevin argued that higher wages were required to meet the high cost of living, and were still needed though the latter had begun to decline. The municipal tramway authorities had made large contributions to relief rates in prosperous times instead of accumulating the profits to meet lean times like the present. A wage to maintain a proper standard of living was insisted on in any circumstances. Mr. Bevin in conclusion referred to growing unemployment in industry and said that unemployment was brought about by the machinations of American and other financiers to enable them to lower the standard of living.

Witnesses representing the trade unions concerned were afterward heard, and subsequently the wives of some tramwaymen were called and testified that the wages of their husbands were insufficient for the proper maintenance of their families.

RAILWAY BURDENS TOO GREAT

H. Gordon, a member of London County Council, was also called as a witness for the employees. He advanced the view that in calculating the commercial value of a tramway the local rates which had to be paid in respect to the track should be placed on the credit side. He considered that if tramways were properly managed and were not charged for street widenings and were freed from local rates on the tracks great prosperity was in store for them. The present condition of street traffic in London he described as chaotic and disgraceful. He said that £200,000 a year was wasted by time that is lost at London tramway dead-ends.

The Court sat for three days a week. It began the case for the employers on Feb. 2. J. H. Beckett, secretary of the Municipal Tramways Association, testified that owing to the financial loss the undertakings could not give the advance of wages asked for. He showed that on the undertakings of sixty-six authorities there had been a drop during the last sixteen weeks of 1920 of 8,000,000 passengers compared with the corresponding period of 1919. That arose from the slump in trade.

As to wages paid by tramways compared with those in other trades, he said that the tramway man could not be compared with a skilled mechanic who had to serve an apprenticeship. If 2½d. per mile run were allowed for renewals, then eighty municipal tramways in the year 1919-20 were carried on at a loss of £1,500,000. The people using the cars would not pay any more for fare than they were paying at present.

Mr. Beckett also mentioned that the forty-five municipal undertakings which had voted against arbitration represented 15,141 employees and the thiry-nine which voted for it represented 29,344. He opposed the suggestion that the voting should be by the number of employees. As to the charge on tramways for street widenings, the amount was small and confined mostly to London. Other witnesses were heard as to the deficit on tramway working, and on Feb. 4 the court adjourned till Feb. 15 in order that additional statistical information might be prepared and handed in.

It is of interest to note that in orders granted by the Minister of Transport to municipalities authorizing higher fares than the statutory maxima it is stipulated that the municipal tramway authority shall not make any payment out of the revenue of the undertaking to the credit of the borough fund or in relief of rates in any year until they have made reasonable provision for the proper repair, maintenance and renewal of the undertaking, and shall keep such accounts of their expenditure on repairs, maintenance and renewals and shall furnish such returns of the provision made by them and of their estimated future liability in respect thereof as the Minister of Transport may from time to time require. These seem very reasonable and proper conditions in the circumstances.

There are quite a good many municipal Tramway undertakings which in the days of prosperity paid large sums for the relief of the local rates. If that money had instead been accumulated, it would now be of much use.

The Glasgow tramway undertaking is beginning an experiment, to be continued till the end of the financial year (May 31), of running all-night cars for the benefit of late workers. The cars are to run on fifteen routes at hourly intervals on the outward journey from 12:30 to 3:30 a.m., and on the inward journey at 2 a.m. and 3 a.m. only. The fares on the average are about 50 per cent higher than the ordinary fares, and the minimum is 1d. for one mile. It is not expected that there will be any profit on these services, but rather a loss. Inquiries at London and Manchester, the only two places in Britain where all-night cars are run, show that these services are run at a loss. The loss, however, is small compared with the main revenue and expenditure. The Glasgow experiment covers more routes that the night cars do in either London or Manchester. In the matter of these night services, Glasgow is very far behind New York, as my recollection is that cable cars ran all night in Broadway at least twenty-five years ago.

TRACKLESS TROLLEYS MAY BE USED

In the stress of post-war conditions I see the possibility, in this country at any rate, of a new, though perhaps temporary application of the trackless trolley system. There is a proposal before Bradford Town Council to substitute trackless electric cars for the tramway cars on certain suburban routes where the rails are worn out. At present prices it would cost an enormous sum to renew the tracks, so it is thought the railless car might be put on for the present at least. The poles and overhead wires are there already, so all that would be required, after getting the cars, would be to put up negative trolley wires for the return. This course would seem preferable to installing the expensive petrol motor omnibus.

The Birmingham Town Council is considering the trackless car and inquiring into the Bradford experiment of using double-deck trackless cars. The Glasgow Town Council is looking into the question of using the trackless trolley system on suburban routes for which tramway extensions have been authorized but are held up owing to the cost of construction.

Application is to be made to Parliament in the ensuing session for sanction to two great water power schemes in the Highlands of Scotland. One, the Lochaber scheme, is for the purpose of producing electricity to be used mainly for the development of the manufacture of aluminum. The other, the Grampian scheme, promises to supply electricity for all purposes over a wide area including Perthshire and Forfarshire. Between the two something like 150,000 hp. will be developed. The water will be derived from locks and rivers situated at high altitudes among the mountains. Should these schemes be sanctioned, they may possibly lead by and by to the electrification of some steam railways.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Purchase Installment Paid

City of Seattle Meets Its Obligation, but Suit to Review Purchase Deal Goes Before Courts

The Puget Sound Power & Light Company has abandoned its motion for a temporary injunction against the city of Seattle and has thus simplified the preliminary proceedings in the United States District Court in the fight to prevent a review of the city's purchase of the Stone & Webster lines. The need for the temporary injunction was removed because the $375,000 due on March 1 on the $15,000,000 of utility bonds issued to Stone & Webster was paid. The company would enjoin the fourteen taxpayers from making Stone & Webster a party to the state court action, or taking action in any but the federal court to seek a review of the city's contract with Stone & Webster.

TAXPAYERS SUE CITY

The taxpayers have sued the city in the Superior Court, and Judge J. T. Ronald of that court, on Feb. 24, signed an order requiring the fourteen taxpayers to make Stone & Webster party defendants with the city if they take further action in the Superior Court. The taxpayers were granted a ten-day extension of time for filing an amended complaint in the suit.

Otto B. Rupp, counsel for the taxpayers, replied to Stone & Webster attorneys with the assertion that the company's move simply was an attempt to enjoin a proceeding in another court, and with the declaration that the taxpayers in no way sought to force a breach of the contract under which the city paid $15,000,000 for the railway system. He asserted the federal court had no power to restrain the Superior Court proceedings, and declared there was absolutely no necessity for bringing the company into the state courts.

SUIT BROUGHT TO RESTRAIN CITY

Attorney James B. Howe, for the Stone & Webster Company, said the taxpayers' suit virtually was an action to restrain the city from complying with a contract upheld by the Supreme Court. He argued that jurisdiction was acquired by the federal court through failure of the taxpayers to make the company a co-defendant, and the case should proceed to final adjudication in the United States court, which could enjoin any action that would prevent it from granting the relief asked. He said the city wanted to fulfill the contract, and denied the right of taxpayers to interfere.

Judges Neterer and Cushman arranged to hear the case together, each applying such part of the argument as concerned his case, and although the motion for a restraining order against the city was dropped, the two judges continued to hear the arguments on the second case against the fourteen taxpayers.

At the close of the arguments on the suit Federal Judges Neterer and Cushman granted permission to the fourteen taxpayers to file an amended complaint in the King County Superior Court. The modification of the federal court's restraining order, made at the request of counsel for the taxpayers, and over the objections of the company, carried the stipulation that the Superior Court proceedings should go no further pending the federal court's decision on the arguments heard to date. The judges indicated they would hand down their rulings on March 14, and ordered the modified restraining order continued until that date.

No Profits to Share in Virginia

After a six months' trial the profit-sharing plan announced last summer by the Virginia Railway & Power Company, Richmond, Va., has been withdrawn, the operations for the six-month period having demonstrated that there were in fact no profits to share. In announcing the plan on Aug. 15, 1920, Thomas S. Wheelwright, president of the company, said that profit sharing must not be confused with a bonus payment. The operation of the plan was described at that time in the ELECTRIC RAILWAY JOURNAL.

The profit-sharing plan was withdrawn by order of the directors as of Jan. 31, 1920, because there was no surplus to divide. The figures for the six months ended Dec. 31, 1920, which would have been the basis for profit sharing during the next six months, showed a deficit of $37,550, instead of a surplus. A decrease in the number of passengers carried as compared with the same period of 1919 is also noted in the report.

In the strict meaning of the term, "profit sharing" includes sharing in any deficits as well, but no such provision having been made in the plan as originally adopted, it is merely withdrawn and the company will "go it" alone on the deficit.

The importance of the closest co-operation for increasing earnings and economizing in expenditures is being urged by company officials. The company points out that the fact that there is no surplus to divide is not due to any defect in the plan, which was dependent upon the closest co-operation for economy, increased business, fewer accidents and more perfect fare collections.

Relief Recommended

Committee of Green Bay Citizens Favors Relieving Company of Paving Costs

A committee of citizens of Green Bay, Wis., has submitted a conclusive report on the traction problem in that city to the City Council. Some eight months ago this committee was created in the hope of promoting improvements and extensions which at a later date were substantially covered in a proposed ordinance presented to the City Council by the Wisconsin Public Service Company, which operates in Green Bay.

The committee in submitting its report, which contains some modifications of the ordinance drafted by the railway, states that its recommendations are offered with a desire to harmonize the interests of the company and the city in order that Green Bay may expand. It believes that better railway service can be brought about through public co-operation which will ultimately mean profitable operation.

The committee favored a service-at-cost arrangement, but the adoption of a grant of this kind for the immediate present was not considered.

COMMITTEE RECOMMENDS RELIEF

The committee and the railway are in accord with respect to improvements which will serve the city's requirements and assist in its growth, such improvements being provided "on conditions which will invite additional investment." Through the Smith & Scheuring Audit Company the committee made an inspection of the company's books and for the six months period audited the Wisconsin Public Service Company failed by $18,000 to earn interest, with nothing provided for dividends.

In view of these facts the committee agrees that some of the concessions asked for by the railway looking toward a reduction in cost should be granted. One important provision of the ordinance dealt with the request of the company to be relieved of the obligation of paving, repaving or repairing any portion of any street in the city. With respect to this matter the committee reports paving obligations have become a real factor in the traction problem.

The committee believes that the attitude of the city toward a public utility question of this kind should be judged in accordance with its effect upon public interest. The committee concludes that as a matter of fairness and for the promotion of sound traction development in Green Bay the company's application to be relieved of paving cost ought to be granted and the committee would so recommend. With respect to maintenance cost it is the opinion of the committee that the company should continue to pay for repairs to all paving where the tracks of the railway do not rest upon permanent foundations and that where permanent foundations are laid or may be laid in the future it be relieved of maintenance.

Public Control Act Upheld

The Supreme Court of Massachusetts has sustained the constitutionality of the statute under which the Boston (Mass.) Elevated Railway Company is being operated by a Public Board of Trustees with the return on investment guaranteed by the State for a period of ten years from 1918. The city of Boston brought suit to recover from the trustees $2,905,931 which had been assessed on it, as its share of the Elevated's deficit for the year ended June 30, 1919, in accordance with the terms of the statute. Counsel for the city attacked the law as unconstitutional, but this last decision of the Supreme Court seems to assure the company of comparative security for its investment for the balance of the ten-year period.

The bill filed alleged that in ascertaining the deficit of $4,000,000 the trustees charged for the fiscal year ended June 30, 1919, depreciation of approximately $2,000,000, and $2,300,000 for maintenance and repairs; that the average charged by the Boston Elevated Railway for depreciation for the ten years prior thereto had been about $98,000 each year and was inadequate, in consequence whereof the property had run down and was badly depreciated; that the amounts charged are "excessive, unreasonable and unnecessary," and that if the assessment of the deficit was made according to the act the plaintiff, as one of the cities liable, would be called upon to pay a very large proportion of the sum to be paid by the commonwealth to the railway.

ACT APPROVED

The Supreme Court in its finding said:

> In essence, this act having been accepted by the railway companies, constitutes an agreement between the Boston Elevated Railway and the Commonwealth, that the latter shall take over the management and operation of the railway and shall pay therefor the amounts specified in way of compensation for the use thereof. The public operation is undertaken by the Commonwealth, not as a source of profit, but solely for the general welfare. The main design of the act is public operation at such rates of fare to be fixed by the trustees from time to time as shall afford revenues sufficient to defray all charges and the dividends established by the act.
>
> There is no distinction in principle between the management and operation of such a transportation system by a public agency established by the Legislature and the taking over by counties, cities and towns of toll bridges and turnpikes, originally private enterprises. It has been held that public ownership and operation of a ferry constructed at public expense for the uses of a street railway of the Boston Subway all are valid under the constitution.

Both Sides See Victory Ahead

City of Detroit Elated at Supreme Court Ruling—D. U. R. Sees More Need than Ever for Service-at-Cost

The decision of the United States Supreme Court handed down on Feb. 28 clarifies the street railway situation in Detroit greatly, sustaining the action of Federal Judge Tuttle in denying an injunction asked by the Detroit United Railway restraining construction of the Detroit Municipal Street Railway. In this decision the court considered both the validity of the election in Detroit and also whether the method proposed by the city would be a deprivation of the railway's property rights without due process of law, in violation of the fourteenth amendment of the Constitution.

THE Fort Street decision is reaffirmed wherein it was held that a street railway which is operating under a franchise granted for a definite period and has enjoyed the full term of the grant could be required within a reasonable time to remove its tracks and other property from the streets upon failure of renewal of the grant, and it declares that the so-called day-to-day arrangement or the expenditure by the company of large sums of money on its property with the knowledge and acquiescence of the city did not affect this right.

CORPORATION COUNSEL EXPRESSES VIEW

The charge was made by the company that the city officials were engaged in a scheme to compel the company to part with its property at a sum much less than its fair value, but the court held that the city has the right to acquire the property on the best terms it can make with the company, and an attempt to buy the property at much less than its value would not deprive the company of property without due process of law. Moreover, the court said under the Constitution of Michigan no city or village can grant any public utility franchise which is not subject to revocation at the will of the city or village, unless such proposition shall first have the affirmative vote of three-fifths of the electors, so that the city could not effect any purchase without such approval. In fact there is nothing in the ordinance attacked which undertakes to acquire the property of the complainant without compliance with this charter provision. Finally, the court declared that the form of submission of the question was in substantial compliance with the law. This makes it mandatory for the Street Railway Commission to proceed to acquire a municipal street railway system and as soon as possible make the municipal system exclusive.

According to Corporation Counsel Wilcox the Supreme Court decision answers all the claims of the Detroit United Railway that have crept into the conferences between the city and the company, and also establishes the fact that there is no such thing as a franchise by estoppel as proposed by Charles Evans Hughes in his argument for the Detroit United Railway. The decision, Mr. Wilcox states, meets the primary contentions of the Detroit United Railway in all its other suits against the city filed since April 5, 1920, and also that in the suit of the Clairmount residents, decision in which was for the city. The city officials consider the decision the most important one ever obtained by the city in court and believes that, coming from the highest tribunal in the country, there can be no appeal from it.

Commenting on the Supreme Court's decision Elliott G. Stevenson, attorney for the Detroit United Railway, stated that the people have the matter of settlement in their own hands and can decide to have continued service under what is universally conceded to be the fairest ordinance ever submitted to the people of Detroit or any other city—or they can decide to go without service as far as the company's lines are concerned. It was cited that in 1918 the Council instructed the Corporation Counsel to commence proceedings to oust the company from the streets on which franchises have expired. This question is now before the Michigan Supreme Court.

COMPANY'S POSITION OUTLINED

The decision, according to Mr. Stevenson, states that if the people of Detroit desire to have the service of the Detroit United Railway stopped, its tracks torn up and junked, and so express themselves in a proper way—at an election at which the question is submitted—it is within their power to bring about that result. Also that the municipal ownership plan submitted by Mayor Couzens a year ago is valid. Further, that as the city, speaking through the people, has the power to stop service and have the railway company's property removed the company likewise has the right to stop service at any time it sees fit.

That the Detroit United Railway is not making any threats of trying the so-called "Toledo treatment," as has been implied, is best shown, Mr. Stevenson says, by the fact that the company is contending that ouster by resolution is not legal, but that if such proceedings are to be taken and service is to be stopped it must be done by ordinance so that the people themselves, vitally interested in the matter, can have the right to affirm or reject through a vote under an initiative petition. He thinks the situation, now most acute, could readily be settled by the adoption of the proposed service-at-cost ordinance which the company has offered to accept. This ordinance will come up for ratification at the polls in April.

M. O. a Success

New York's Commissioner of Plant and Structures Says So Himself of Staten Island Lines

Grover A. Whalen, Commissioner of Plant and Structures of the city of New York, is claiming success for municipal ownership of the Staten Island trolleys on the basis of the three months of operation from Dec. 1, 1920, to March 1, 1921. He says the figures for the period will show that every expense was covered by receipts during a season when traffic was at its lowest ebb, and that the experiment on Staten Island has vindicated the city's claim that a transit line can be operated successfully on a 5-cent fare.

The city took over the Staten Island Midland Railway Company on Dec. 1, after it had gone into bankruptcy because an increased fare was not allowed, with the provision that the city should pay for all operating expenses and in event of profits being made that they should be divided fifty-fifty with the receivers.

Mr. Whalen is quoted as follows:

> By spring the city will be operating not only the Staten Island trolley lines and the Williamsburg Bridge local line but also the New York & North Shore lines, service on which was suspended more than a year ago. The city is now negotiating with Federal Judge Chatfield, who appointed the receiver for the North Shore lines, for an agreement similar to the one entered into with the city regarding the trolley lines of Staten Island. I have every reason to believe that the court will allow the city to operate the North Shore lines on the same conditions.
>
> We have carried 20,000 passengers daily, and that is the lowest average of the year. In the summer we expect to be carrying 100,000 or 150,000 a day. We have given better service than the Staten Island Midland Railway, and that is, I believe, an important reason for our success.
>
> But for the intelligent view which Judge Chatfield took of the hopeless transit situation confronting the people of Staten Island, and his broad-minded co-operation with the city in its endeavor to apply a remedy, municipal operation of the lines in question would have been impossible. He gave the city an opportunity to show that it is capable of operating transit lines and give good service at a 5-cent fare, which our predecessors had declared impossible.

The investment of the city in the Staten Island trolley system for cars amounts to $194,000 up to date, according to Commissioner Whalen, but more cars will have to be purchased in the spring to meet the demand of the summer traffic. Mr. Whalen intends to acquire a number of second-hand cars.

Merchants at Akron Urge Franchise Revision

The Retail Merchants' Association of Akron, Ohio, has taken a hand in an effort to settle the traction problem in that city. Resolutions have been unanimously adopted and presented to the City Council urging the Council to take immediate action. The Akron Rotary Club, Kiwanis, Gyro, Exchange and Lions Clubs of the city have taken similar action and a concerted movement is on to enforce settlement.

The move to settle the controversy was started by Jerome Dauby, general manager of the M. O'Neil Company, one of the largest department stores in the city.

As pointed out in the ELECTRIC RAILWAY JOURNAL recently, the people of Akron are demanding an extension and development of the city system. The Northern Ohio Traction & Light Company has taken the position that extensions and development cannot be made until the system shows earnings sufficient to borrow the money and that it would be impossible under the proposed franchise to secure the funds necessary for this purpose.

Conciliatory Attitude Now in Detroit on Crossings

Petitions have been filed by the Detroit United Railway in the Circuit Court asking that six Detroit city officials who are held responsible for the forced crossing on Jan. 9 of the Detroit United Railway's Mack Avenue line by the city's St. Jean line be adjudged in contempt of court and punished for violation of the injunction issued by Judge Dingeman forbidding the crossing.

Announcement was later made by the company in a letter to the Corporation Counsel that the crossing of the D. U. R.'s tracks by the city lines will not be opposed provided the work is properly carried out and that plans therefor are previously approved by the company. The company's action in permitting crossings does not affect the status of the controversy relative to the Mack-St. Jean crossing. The injunction obtained against the city will not be waived and the contempt charges against the city officials will not be withdrawn. It is not the intention of the company to waive any of its legal rights.

It has been intimated by Detroit United Railway officials that permission would have been granted the city to make the crossing at Mack Avenue if plans for the crossing had been submitted to the company and had met with approval. The company's attorney stated that it was not proposed to prevent crossing of the company's tracks by the municipal railway if the city has the right to construct and operate a railway system under the proceedings taken, but it is insisted that the crossings shall be done in an orderly way and only after plans for the work have been considered and approved by both parties concerned.

The company further states it may be that it would prefer when the plan shall have been approved for a crossing, that the installation be made by the Detroit United Railway so that interference to traffic may be reduced as much as possible. This, however, is a detail that can no doubt be arranged satisfactorily. The installation of crossings now sought to be made is to be carried out with the understanding that the company's claims to lawful rights shall not be prejudiced.

The engineers for the Street Railway Commission plan soon to submit blueprints for a number of crossings according to Joseph S. Goodwin, general manager of the municipal lines.

Loss Is $93,000 a Month

Service-at-Cost at Toledo Ushered in at Bad Time, but Commissioners Are Hopeful

Commissioner Wilfred E. Cann has reported to the Board of Control at Toledo, Ohio, that the Community Traction Company is running behind in its operating expenses at a rate of $93,000 a month, considering the payments to be made to various funds for maintenance, betterments, interest and sinking fund.

A full report also showed that nearly 100 jitney buses are carrying 12,000 or more passengers daily in direct competition with the railway on choicest routes and at peak hours.

The board immediately drafted a letter to the Council and recommended drastic regulation of the jitney competition. The matter is now in committee and the law director is working on a bill to be patterned after the Cleveland regulatory legislation.

The railway last year paid in taxes and license fees an amount equal to $800 for each one of the cars which it operates.

The matter of power contracts was also taken up by the Board of Control at its meeting. The members hope to be able to make a contract between the Community Traction Company and the Toledo Railways & Light Company or Acme Power Company which will put city street lighting and railway power on the same basis or make a joint proposition out of all power bought by the city.

A ninety-day period is allowed under the new franchise for making interurban contracts. Mr. Cann favors a contract based upon car mileage while President Coates of the Community Traction Company favors a percentage of the receipts of city fares as a basis.

Mr. Coates told a group of business men recently that the service-at-cost plan was started at a time when factories were closed, men out of work, the buying public on strike and business in general flat, but that he expected in the course of a year the plan would show up very well.

Chairman Henry Truesdall of the Board of Control and other board members have expressed themselves as not at all downhearted at the first report of financial conditions of the railway.

Plea for Municipal Ownership in Massachusetts

Interesting side lights on the point of view of the public in regard to the problem of electric railway service in Brockton, Mass., were brought out at the hearing recently in Boston on the bill of Representative Frank A. Manning to provide for municipal ownership of such lines by communities that might desire to take over the railways. The statement was made that 70,000 people in Brockton are not members of the local Chamber of Commerce and that the vote of that body recently against municipal ownership was not truly representative of the opinion of the public. The secretary of that body was quoted to the effect that at the vote only one-third of the membership expressed an opinion on the subject.

The author of the bill said that there was much talk about the investment of the widows and orphans in the securities of the electric railways, but that it was about time more thought was given to the widows and orphans who had to use the cars and to others of small means who desired convenient, comfortable and safe transportation at a reasonable fare.

Mr. Manning also wanted to know why the electric railways were singled out for State aid. He said that if the fact were true that because of their so-called public service the electric railways were entitled to special consideration at the hands of the State, then other businesses, with no less potent a claim, would soon call upon the State to insure them against loss in the operation of their properties.

It was his idea to have the public take over the railway lines, couple up as an operating unit the city of Brockton and the surrounding towns, eliminate unnecessary railway mileage, operate at a basic 5-cent fare and then assess any loss from operation against the respective communities on the basis of miles of track or some other unit fair alike to all places sharing in the service.

Industrial Court Urged for New Jersey

Fred C. Carstarphen, past-president of the Engineers' Club of Trenton, N. J., gave an illustrated talk before members of that body recently on "The Kansas Court of Industrial Relations and the Denver Street Car Strike." It was his opinion that the only proper method of settling labor disputes was through a court of industrial relations similar to the one now in existence in Kansas.

The Kansas Court of Industrial Relations had legal backing and labor disputes must be settled in a legal way to remain settled. He could not imagine why business men or railway officials in New Jersey did not get busy and have a bill similar to the Kansas measure adopted in that State. Mr. Carstarphen said:

> During the time the court has been in existence in Kansas there has never been an appeal made to the higher courts on a decision of the industrial body. If New Jersey adopted such a state measure there would be no future bloodshed, loss of wages or destruction of property in strikes and other disputes. The promises of labor leaders that there will be no trouble are never kept.
>
> Trolley employees in some of the larger cities have asked for ridiculous wages. Operators of electric railway cars who feel they are underpaid ought to seek some other employment. With all fairness to the union man, the labor union is not benefiting him to any great extent.

Mr. Carstarphen is a former resident of Denver. He was acquainted with both officials and employees of the Denver City Tramway and made a study of the strike in that city.

Newspaper Attack Resented

Railway at Albany Seeking to Resume Service After Strike Sues for $100,000 in Damages

Harry B. Weatherwax, vice-president of the United Traction Company, Albany, N. Y., has reiterated the stand of the company to the effect that no matter what develops the company will not arbitrate or compromise with the men in any way and that all relations between the company and the union ceased on Jan. 29, when the strike was declared.

Mr. Weatherwax is quoted as follows:

> The company receives about $300,000 a month from operation. This company cannot pay 60 cents an hour and make money. To raise fares to meet that cost would be impossible, because residents will not pay it. There is no use in raising wages and then going to the Public Service Commission and asking for an increased fare. That is what it amounts to every time wages are increased.

STATE CONSTABULARY GUARDING ALBANY CARS

> We can give a good service at 45 cents an hour, and residents will not be called upon to pay higher fares. We might just as well have this issue settled now.
>
> We have recruited a good force to take the place of the striking employees. They have come to us at 45 cents an hour. We will start regular service within a few days. The men who are operating the cars now will not be retained. The force that is being recruited will be a permanent one.
>
> We are receiving letters every day from all parts of the east from men who are experienced conductors and motormen and are willing to work at 45 cents an hour.
>
> The question of arbitration is closed for all time. There is no use discussing this matter any further. We are going to operate our company on the 45-cent basis, and that's all there is to it.

The company also said it had brought suit against the Albany Evening Union Company, publisher of the *Times-Union*, to recover the sum of $100,000 damages for libel. The complaint states that on or about Jan. 29 substantially all the employees of the railway left its service, thereby stopping the operation of all its cars. Subsequently and on Feb. 4 the Public Service Commission made an order directing the company to resume operation, and in compliance with that order the company began to operate its cars on Feb. 8. Afterward, or about Feb. 18, the company charged, the *Times-Union* printed in large type the following:

> "PAY AS YOU ENTER" Was the Sign on the United Traction Cars Before the Strike.
>
> "With the incompetent strike-breaking motormen now running the cars the sign ought to be:
>
> "PRAY AS YOU ENTER."

This notice is said to have been repeated daily in the *Times-Union*. It is further stated that the publication, distribution and circulation of the notice, which the United Traction Company claims to be false and defamatory, was for the purpose of giving public admonition to the company's patrons that it was unsafe to use the cars and become passengers thereon and to prejudice the public against the company and thus injure its business.

Mr. Mitten Not a Modern Dives

Wide publicity has been given by the daily press of the country to the statement made by T. E. Mitten, president of the Philadelphia Rapid Transit Company, to the effect that having achieved for himself some years ago a money competency which he considers adequate to his needs he has given away since each year all surplus over his expenses for the year. It was an unusual statement, made in an unusual way at an unusual event.

The occasion was a testimonial banquet on March 2 to Mr. Stotesbury and Mr. Mitten by the Co-Operative committees in celebration of the tenth anniversary of the successful operation of the co-operative plan. So many versions of Mr. Mitten's remarks have appeared, however, that the part of his statement outlining the principles that guide him are reproduced direct from the stenographic record of the meeting. Mr. Mitten said:

> A great amount of money is a hurtful influence. I tell the Doctor, my son—and I think the thought originated with him—that I will never deprive him of the pleasure of making money. Therefore, I will never leave him any. But he has gone me one better, and since coming back from service overseas he has insisted that I don't give him any money now. And so he is perhaps better able to keep in contact with you in the only way that one can keep in contact with another, that is, by meeting you on even terms, in that he has to figure out his costs as against his pay. Therefore, he has your problem and can better sympathize with you.
>
> Some of us envy the man with money. I have tried for sixteen years—it makes me sad when I have to think how long ago it was since I was forty—but when I was forty, and had accumulated all the money I thought a man needed to live on, I decided I would not follow the example of the men that I saw piling up riches. That gentleman who unfortunately is not with us tonight, and whom you have seen me bring to you at every meeting before, Mr. Robinson, New York, taught me the lesson that it is better to give than to receive.
>
> There is a rich man who has consistently, since 1896, backed me through thick and thin financially, when all other financial interests deserted me, and I have seen him always give and find joy in giving, never planned to receive at all. Following him at forty I determined that life and the struggle was a game, and so while I played it, as many hours of a day and as hard perhaps as any other, at the close of each year for sixteen years I have given away all of my earnings, only trying to hold intact the money that I had at forty. So that I don't have to worry about making money. It is of no interest to me. I am therefore free to enjoy the game, and a great deal of pleasure comes from it.

Conditions for Blanket Franchise in Richmond Summarized

Thomas S. Wheelwright, president of the Virginia Railway & Power Company, Richmond, Va., on March 2 issued a statement of the underlying principles which the company considers as the sound economic basis on which to base a new blanket franchise for all the Richmond railway lines. He summarized the position of the company as follows:

1. That the city, in granting a new franchise, recognize the value of the railway property now in the service of the public. In arriving at this value a careful inventory has been made of just such property as is now in use, cutting out such as has been abandoned or that is not useful in the service. This value, at the average of prewar and present prices, is $12,488,841—for the railways, including outlying lines, bridges, viaducts, etc.

2. That the franchise include the obligation to at all times authorize such rates of fare as will earn a just and inviting return upon this investment in order to insure the integrity of the present investment and to induce additional capital to flow into the enterprise for the purpose of extending the service to the needs of the community.

3. That the policy of the city will have to be made plain in this franchise as to whether it includes all lines outside of the city and whether it will assume the obligation to fix such rates of fare as will insure a return on the whole investment, including the outlying lines, having one standard fare prevail throughout the Richmond system, including free viaducts.

4. That it is desirable the fare be as low as possible in order that the railway may perform its proper function of service to the community. To accomplish this the new franchise should relieve the company of all burdens in the way of tax on franchises, paving, etc., which are not proper charges against the car rider, since the company already pays taxes on the assessed value of its property, the same as any other enterprise. Under present conditions the car rider is taxed to the extent of at least one-half a cent for every ride and, in addition, a paving tax is imposed, which is not as legitimate for the car rider to pay as for the person using a private vehicle, since the latter uses the street to a far greater extent than the car rider who, using the rails and riding in groups, uses the street in the most economical manner possible.

News Notes

Men Accept Wage Cut. — The employees of the Charles City (Ia.) Western Railway have offered to accept a 20 per cent reduction in wages in order to assist the company in meeting the present emergency of increased costs.

Suburban Lines Reduce Wages.—The New York & Long Island Traction Company and the Long Island Electric Railway recently reduced the wages of the employees 12½ per cent. This applied to all departments, operating, engineering, legal, etc. A similar reduction of 12½ per cent was put in force on March 6 on the lines of the New York & Queens County Railway.

Steam Service on Electric Line.—Because of overhauling its turbines in the Westville Power Plant which has resulted in insufficient electric power to handle peak periods, the West Jersey & Seashore Railroad has substituted temporary steam service between Camden and Glassboro and Camden and Millville, New Jersey. During the summer if the repairs are still under way it may be necessary to increase this steam service to take care of service during the peak hours.

Wages Reduced in Muskegon.—The Muskegon Traction & Lighting Company, Muskegon, Mich., has reduced the wages of its trainmen 16 per cent, or from 62 to 52 cents. George Steinwedell, president of the company, is quoted as follows: "Something must be done in the present crisis if the railway is to continue to operate. I wish it was possible for this company to obtain the advice and suggestions of citizens of Muskegon. I am sorry that there are some here that still look with suspicion on all statements of the company, after we have tried to adopt a policy of placing the facts before the public at all times. That has been my policy since taking charge of the local company. We desire helpful criticism and suggestion, but we do not believe that this is the time for fault finding."

Will Study Fresno Finances.—At a public meeting recently held in the Fresno Council Chamber to consider transportation problems and the service-at-cost system of operation a committee was appointed to look into the finances and service of the Fresno (Cal.) Traction Company and the operation of the plan as proposed for the city. Mayor Toomey and Manager Webster of the Fresno Traction Company addressed the meeting. Mr. Webster mentioned the fact that many eastern cities "had taken their utilities in hand and arranged for a franchise under which the integrity of the investment was guaranteed." The Mayor said that the company was entitled to a fair return on its investment and the public to a fair return in service.

Programs of Meetings

New York Railroad Club

The next meeting of the New York Railroad Club will be held in the Engineering Societies Building on March 18. Frank M. Brinkerhoff will present a paper, "Safety of Passengers in Steel Cars," illustrated with lantern slides.

American Railway Engineering Association

The twenty-second annual convention of the American Railway Engineering Association will be held in the Congress Hotel, Chicago, on March 15-17. After the president's address, on March 15, reports of committee on track, rail, electricity and other subjects will be heard. Among the committees to report on Wednesday, March 16, are those on Economies of Railway Labor, Shops and Locomotive Terminals. On Thursday the reading of papers will be heard, followed by the election of new officers. The annual banquet will take place on March 16. Among the speakers scheduled for the dinner are J. F. Wallace, consulting engineer, New York; David Kinley, president University of Illinois.

Annual Banquet of New England Street Railway Club

John W. Belling, secretary of the New England Street Railway Club, announces the annual meeting and banquet to be held at the Copley Plaza Hotel, Boston, Mass., on Tuesday, March 22. The program includes the annual meeting at 3 p.m. for the election of officers for the ensuing year. At 6 p.m. there will be a general reception followed by the banquet at 6:30.

The committee announces as speakers Hon. Selden Palmer Spencer, United States Senator from Missouri; his Excellency Channing H. Cox, Governor of Massachusetts, and Hon. Andrew J. Peters, Mayor of Boston. Alonzo R. Williams, attorney for the Rhode Island Company, will act as toastmaster.

Tickets for the annual banquet are $6. Secretary Belling is sending out to members a unique desk blotter reminder of the affair. Applications for tickets should be addressed to the club at P. O. Box 2564, Boston.

Joint Convention of Illinois Utility Associations

The seventeenth annual meeting of the Illinois Gas Association, the twentieth annual meeting of the Illinois State Electric Association and the twelfth annual meeting of the Illinois Electric Railways Association will be held in joint convention at the Hotel Sherman in Chicago on March 15 and 16. On Tuesday, March 15, at the opening session John F. Gilchrist, vice-president of the Commonwealth Edison Company will read a paper "Financing Through Your Customers." At the afternoon session the following papers will be read, "Passenger Traffic Analysis and Control," by M. J. Feron, Chicago Elevated Railroads; "Shop Organization and Maintenance and Inspection of Equipment," by J. M. Bosenbury, Illinois Traction System; "Introducing the Employee to the Job and Following Him Up," by W. R. Helton, Manager Real Estate Department, South Side Elevated Railroad. On Wednesday, March 16, Philip H. Gadsden, president of the American Electric Railways Association, will tell just what his association is doing. The following papers will be read at the afternoon session, "Testing of Instrument Transformers," by F. A. Kartak, professor of Electrical Engineering, School of Engineering of Milwaukee; "Hazards of Faulty Switchboard Construction," by R. M. Bert, electrical superintendent Rockford Electric Company; "Labor Saving Devices of the Maintenance of Way Department and What They Save," by Charles Clark, Cleveland Railway; "Merchandise Service and Its Possibilities," by D. W. Snyder, general superintendent, Bloomington & Normal Railway & Light; "Results of Automatic Substation Operation," by C. H. Jones, Chicago, North Shore & Milwaukee Railroad. In addition to these papers others will be presented of interest to gas and electric light companies.

Financial and Corporate

Commissioner Demands Changes

Cincinnati Official Wants Corporate Structure of Railway Changed and Franchise Modified

Complete financial reorganization of the Cincinnati (Ohio) Traction Company and separation of that company from all other activities except those necessary for the operation of a street railway have been demanded by William C. Culkins, director of street railways, in a letter sent to the Cincinnati Traction Company and the Cincinnati Street Railway. The letter was sent by Mr. Culkins after a conference with Mayor John Galvin and City Solicitor Saul Zielonka.

Mr. Culkins also demands "either the surrender or modification of the present franchise or the acceptance by a new company of a new or modified franchise, which shall include such changes as may be shown by experience in this and other cities to be advantageous to the public including special fares for school children."

VIGOROUS ACTION NECESSARY

In his letter, Mr. Culkins points out that the railway situation has reached a point where the most vigorous and drastic action is essential. The acute conditions are said to be the result of a period of economic stress due to deflation and readjustment which has brought heavy losses of traffic on all lines of the Cincinnati Traction Company because of unemployment and high fares. Mr. Culkins stated that he had the authority under the present franchise to enforce his demands, and that he would do so, if the companies do not voluntarily accede to them. Mr. Culkins' letter to the two companies follows:

> So involved has the situation become that the public interests demand the taking of immediate steps for the solution of the present difficulties, which so seriously interfere with the performance of your contractual obligations. I feel, therefore, that it is my duty to require that the following program be carried out:
>
> 1. That complete financial reorganization be made of your companies with a divorcement of all other activities from those necessary for railway operation, in order that the city may deal with a single responsible corporation. This should include a scaling down of the present capitalization in order that the burden of fixed charges may be reduced and that the company may be placed on a sound financial basis which will enable it to obtain the necessary funds for carrying out such improvements and betterments as public convenience may require.
>
> 2. That accounts be promptly adjusted between the Cincinnati Traction Company and its collateral corporations as ordered by the director of street railroads, upon which suit is now pending; and the discontinuance of the present objectionable interrelations between these or other companies.
>
> 3. That the present franchise be surrendered or modified and a new or modified franchise be accepted by a new company which shall include such changes as may be shown by experience in this and other cities to be advantageous to the public, including special fares for school children as desired by the City Council and other amendments which have been suggested.

In reply to Mr. Culkins' demand to reorganize the three companies, W. Kesley Schoepf, president of the Cincinnati Traction Company, said plans are under way for merging the companies which jointly own and operate the railway system of Cincinnati. These companies are the Cincinnati Traction Company, which operates the street railway system; the Ohio Traction Company, which owns stock of the Cincinnati Traction Company, and the Cincinnati Street Railway, which owns property which the Cincinnati Traction Company operates.

While no definite plan has been worked out, the officers of the companies have on numerous occasions expressed their belief that something should be accomplished in the direction of simplifying the inter-corporation relations of the several companies, Mr. Schoepf said. It is expected that some definite recommendations can soon be made to the companies concerned.

Sacramento Northern Line Sold

The Western Pacific Railway, San Francisco, has elected to purchase the bonds and securities of the Sacramento Northern Railway actually deposited on the terms mentioned in its offer, the time for such deposits having expired at the close of business on Feb. 23.

In addition, the Western Pacific announced that it would purchase on the same terms any other bonds and securities of the Sacramento Northern which might be deposited with the First Federal Trust Company or the Union Trust Company before the close of business on March 5.

The Western Pacific's action in accepting present deposits as sufficient, and extending to remaining holders the privilege to deposit their securities until March 5, closes the matter. Approval of the deal must be obtained from the Railroad Commission and the Interstate Commerce Commission.

$778,113 Loss in Providence

Operation Under the Receivers During Year 1920 Improved $255,265 Over that of 1919

The Rhode Island Company, Providence, R. I., was operated by its three receivers during the year 1920 at a loss of $778,113, according to its financial statement for the year filed on Feb 26 with the Public Utilities Commission. This deficit is $255,265 less than that of 1919 which was $1,033,397.

The statement filed with the commission also shows that the receivers had at the close of the last year a cash balance in the bank of $1,585,188. This balance is due to the fact that the company has not paid rentals of $1,097,208; interest and discount of $318,300, as well as some miscellaneous expenses and certain taxes, all of which have been charged off against the net income and are included in the deficit.

The company carried 127,482,086 passengers during the year, an increase of 5,966,144.

Analysis of the figures reveals the fact that the receivers have made substantial gains in operation during the year. There were only three months in the year, February, March and November, that the operating revenue did not exceed the operating expense. The report also shows an enormous decrease in the number of transfers issued, it being the first full year that the company has charged for the tickets. The number of transfers issued was 12,818,215, a decrease of 1,377,636.

MORE THAN $8,000,000 GROSS EARNINGS

The company's report shows that during 1920 it paid for power fuel $900,042, an increase of $344,389 over the previous year.

The total revenue per car-mile was 57.66 cents, and the total operating expense per total car-mile was 48.03 cents, leaving 9.63 cents as a net income per car-mile. Last year the company spent $262,502 for snow removal, while the report shows that it spent nothing for removing snow in 1919.

The passenger earnings for the year were $634,260 as compared with $636,081 in 1919, a decrease of $1,821. During the same period the company increased its car-miles operated 18,745 miles.

INCOME ACCOUNT OF THE RHODE ISLAND COMPANY FOR DECEMBER, 1920 AND FOR TWELVE MONTHS ENDED DEC. 31, 1920, COMPARED WITH LIKE PERIODS FOR 1919

	December, 1920	One Month Increase or Decrease	One Month per Cent	Twelve Months to Dec. 31, 1920	Twelve Mos. Increase or Decrease	Twelve Months, per Cent
Total operating revenue	$655,365	*$32,442	*4.72	$8,304,146	$1,333,471	19.13
Total operating expenses	400,705	*329,596	*45.13	6,916,416	988,153	16.67
Net operating revenue	$254,659	$297,154	699.28	$1,387,730	$345,317	33.13
Non-operating income	4,822	2,746	132 28	36,011	*1,841	*4 86
Total net income	$259,482	$299,900	741.99	$1,423,742	$343,476	31.80
Deductions from income:						
Taxes	$196,802	$147,522	299.35	$786,276	$164,390	26.43
Rentals	87,920	*9,196	*9.47	1,097,208	*64,665	*5.57
Interest and discount	26,523	....	....	318,300	*9,954	*3.03
Miscellaneous	....	*5	*100.00	70	*1,560	*95.69
Total deductions	$311,246	$138,320	79.99	$2,201,855	$88,210	4.17
Surplus or deficit	†$51,764	$161,580	75 74	$778,113	$255.265	24 70

* Decrease. † Deficit.

Each month the company set aside a certain amount for claims and other purposes. This amount was not used entirely, and the surplus was applied in the form of an adjustment to the operating expense for the last month of the year.

Brooklyn Roads Still Running Behind

The Public Service Commission for the First District of New York has tabulated the results of operations of all street railroad companies formerly comprised in the Brooklyn Rapid Transit system for the six months ended Dec. 21, 1920. In the column of operating expenses and taxes, which total $22,077,086, is included the expenses of the strike in September last. The strike cost the companies $2,425,902, the report says. The deficit in operating income of all the companies for the six months is $2,237,690.

The total income deductions for the payment of interest, etc., on obligations of both the corporation and the receiver aggregated $5,138,735. The total deficit after fixed charges of all companies is $6,881,715.

The Brooklyn City Railroad, which began separate operation on Oct. 19, 1919, shows the following figures for the last six months of 1920: Operating revenue, $4,826,445; operating expenses, $5,426,392; operating deficit, $599,946; non-operating income, $40,032; gross income (deficit) $559,914; income deductions, $339,849; net income (deficit) $899,764.

Compared with the corresponding period in 1919, the figures for the last six months of 1920 for all the companies formerly comprised in the B. R. T. system, show a decrease in operating revenue of $103,917, an increase in operating expenses of $4,084,351, a decrease in gross income of $4,158,775, and a decrease in net income of $4,731,343.

Portland Notes Offered Direct to Public

Employees and customers of the Portland Railway, Light & Power Company, Portland, Ore., and the general public are now being offered for direct sale $1,000,000 of 8 per cent five-year gold bonds of the company. Sales are being made on the partial payment plan. The proceeds are to be used for betterments and improvements.

The earnings and expenses of the company for the twelve months ended Dec. 31, 1920, as made public in connection with the present financing, were:

Gross earnings		$9,564,615
Operating expenses and taxes	$6,031,311	
Depreciation	717,386	6,748,697
Net earnings		$2,815,918
Fixed charges (bond interest, etc.)		2,104,459
Surplus		$711,459

The company explains that the surplus for the year 1920 was nearly nine times the annual interest charge on the $1,000,000 of notes now offered.

Stock Return Not Earned

Earnings of $487,027 in Dispute Before Courts May Alter Situation in Buffalo

Notwithstanding the increase in fares granted during 1920 by the New York State Public Service Commission, the International Railway, Buffalo, failed to earn its fixed charges by $149,570 according to the annual report of the company for the calendar year 1920. Bond interest, however, was paid and the deficit made up by reducing the amount set aside for depreciation and renewals.

There is a chance for this deficit to be liquidated, provided the State courts uphold the commission in granting increased fares on the interurban lines. Rebate slips have been issued since the fares were increased. The value of such slips now outstanding amounts to $487,027. Thus, if it were possible to credit this money to income, there would be a balance of $337,458 instead of a liability. This balance is equivalent to $2.09 on each share of the outstanding stock.

INCOME ACCOUNT—INTERNATIONAL RAILWAY, BUFFALO

Year ended Dec. 31	1920	1919	Per Cent Change
Passenger revenue	$10,860,135	$9,020,790	+20.39
Other operating revenue	343,982	280,116	+22.80
Total railway operating revenue	$11,204,117	$9,300,906	+20.47
			Per Cent Operating Revenue
Way and structures and equipment:			
Maintenance	$1,699,272	(a)	15.16
Depreciation and renewals (b)	866,430	(a)	7.73
Power operation	632,468	(a)	5.65
Conducting transportation	3,882,558	(a)	34.65
General and miscellaneous	1,861,396	(a)	16.61
Total railway operating expenses	$8,942,124	(a)	79.80
Net operating revenue	2,261,993	(a)	20.20
Taxes	674,365	(a)	6.02
Operating income	1,587,628	(a)	14.18
Non-operating income	69,579	(a)	.62
Gross income	$1,657,207	(a)	$14.80
Interest	$1,541,531	(a)	$13.76
Rentals, etc.	47,845	(a)	.44
Amortization of discount	67,831	(a)	.60
Net deductions or fixed charges	$1,657,207	(a)	$14.80
Net income	$0,000	(a)	$0.00

(a) Not available.

(b) The formula for depreciation and renewals adopted by the P. S. C. when granting increased fares in 1920 requires a total of $1,016,000 annually. The company failed by $149,569.75 to earn enough to set this aside after paying operating expenses, taxes and fixed charges.

In speaking of the reorganization recently effected by which the International Traction Company was eliminated from control of the Buffalo property, the report states that the primary object of the protective committee was to provide for the liquidation of the accumulated debt of the International Railway. This was accomplished by the sale of securities acquired by the protective committee following the foreclosure of the International Traction collateral trust 4 per cent mortgage. After providing for its obligations, the protective committee cancelled $2,070,189 of notes issued by the International Railway to the protective committee. This act by the protective committee represents in effect the contribution of $2,070,189 to the International Railway by the stockholders, which overcomes the impairment of capital amounting to $1,887,504 as shown by the deficit in the balance sheet as of Dec. 31, 1920, and provides a balance of $182,685, applicable to surplus.

VOTING TRUST AGREEMENT

In arranging to raise approximately $2,000,000 for the rehabilitation of the property, the protective committee provided for a voting trust conferring upon voting trustees power to vote the stock of the company for a term of five years, and delivered to these trustees $1,944,000 of railway refunding and improvement 5 per cent bonds and $640,500 of underlying 6 per cent first mortgage bonds. The voting trustees hold these in trust, but with power to sell or otherwise use the bonds and the proceeds thereof for the benefit of the company or the holders of the voting trust certificates.

The Lockport & Olcott Railway mortgage, which amounted to $800,000, became due on July 1, 1920. Failure to pay at maturity the bonds secured by this mortgage would have created a default under the refunding and improvement 5 per cent mortgage of the International Railway. The banks in Buffalo and vicinity developed a plan for the exchange of these maturing bonds for a new issue of $800,000 of International Railway five-year 7 per cent collateral trust bonds secured by $1,200,000 of refunding and improvement 5 per cent bonds. The $400,000 left after payment of the Lockport and Olcott bonds were delivered to the International Railway by the protective committee in order to assist financing the maturing underlying issue. The holders of the $600,000 of Lockport-Olcott bonds accepted this exchange; $195,000 was paid in cash, and $195,000 of the five-year 7 per cent collateral trust bonds are now held in the treasury of the International Railway Company.

State Aid Imperative

President Storrs of Connecticut Company Says Paving, Tax and Other Charges Must Be Rescinded

Only $11,381 was earned as operating income by the Connecticut Company during 1920. This figure and others pertaining to the conduct of the business of the railway for the year were made public by L. S. Storrs, president, at the meeting of the Connecticut Company section of the American Electric Railway Association at New Haven on March 3. The figures follow:

COMPARATIVE EARNINGS OF CONNECTICUT COMPANY — NOT INCLUDING NEW LONDON DIVISION

	1917	1918	1919	1920
Gross revenue	$10,023,162	$9,935,750	$11,043,804	$12,287,505
Operating expenses	7,821,005	8,150,433	9,210,376	11,586,439
Net operating revenue	$2,202,157	$1,785,317	$1,833,428	$701,066
Taxes	594,509	575,888	619,657	689,685
Operating income	$1,607,648	$1,209,429	$1,213,771	$11,381

PERCENTAGE OF TOTAL REVENUE OF CONNECTICUT COMPANY APPLICABLE TO EACH ITEM OF EXPENSE

	1916	1918	1919	1920
Wages	37.5	47.4	50.7	59.6
Electric power	12.0	16.4	15.5	16.5
Maintenance of paving, track, etc	8.0	4.7	5.6	4.4
Maintenance of equipment	3.0	5.4	4.1	5.8
Depreciation of equipment only	1.0	0.7	0.6	0.6
Miscellaneous and general expenses	6.0	7.4	6.9	7.7
Taxes	4.5	5.8	5.6	5.7
Rentals and interest	10.0	10.2	10.0	10.7
Balance for improvement and return on value	18.0	2.0	1.0	....
Deficit	....	....	....	11.0
Total	100.0	100.0	100.0	100 0

ITEMIZED DIVISION OF OPERATING EXPENSES OF CONNECTICUT COMPANY

	1917	1918	1919	1920
Payrolls	$4,344,296	$5,054,858	$5,959,332	$7,796,537
Coal	847,963	902,884	676,258	1,055,210
Materials	1,393,294	1,463,260	1,195,028	1,328,973
Accidents	268,029	317,505	325,810	357,168
Insurance	48,059	63,170	65,659	70,163
Power purchased	385,000	378,000	467,000	578,000

Mr. Storrs explained that the connecticut Company, like all other electric railways, had experienced extreme difficulty in passing through the period of great advance in costs. As shown in the accompanying table wages of the company increased from a percentage of 37.5 before the United States entered the war to 59.6 per cent at the present time. The most noticeable change other than wages was in the cost of electric power. This item increased from 12 per cent in 1916 to 16.5 per cent in 1920. Since 1917 the payrolls have very nearly doubled, increasing by $3,452,241. The cost of coal has increased $200,000. The lower cost of coal in 1919 than in 1918 is explained by the fact that during the summer months of 1918 all storage capacity was utilized in anticipation of transportation difficulties and reduced output of coal. The value of coal on hand at the close of 1918 was $175,000 more than that on hand at the close of 1919. The decrease in the expense for materials in 1919 as compared with 1918 was due to purchases being made in anticipation of general price increases.

In 1917 fares were increased to 6 cents. For the last ten months under this system, namely, Jan. 1 to Oct. 31, 1919, the receipts increased an average of 9.7 per cent per month, while the expenses increased an average of 14.1 per cent per month over the previous year. The zone system was next tried. Compared with the previous year from November, 1919, to May, 1920, the receipts increased 24.6 per cent per month, while the expenses increased 26 per cent per month. The zone system was then revised and from May, 1920, to August, 1920, the receipts increased over the previous year by 10.9 per cent per month, while the expenses increased 45.7 per cent per month. The original 5-cent fare limit system was then reinstalled except that 7- and 6-cent fares were charged. Under this scheme the receipts averaged 7.9 per cent increase and the expenses increased 28 per cent per month over the previous year. This plan had been in operation only about three months when the 10-cent fare was started. Since Nov. 1, 1920, the receipts have increased an average of 24.7 per cent and the expenses have increased about 28.2 per cent.

Except for a loan of $1,250,000 from the government in connection with war activities, it has been impossible for the company to borrow. In consequence the company has been required to use in the regular course of business money which would otherwise have been used for rentals and taxes. In consequence taxes for 1917, 1918, 1919 and 1920, totaling $1,969,880, stand as a charge against the company. The total amount of deferred paving obligations is $648,000.

Mr. Storrs said that the taxes of railways should be based upon net income and not gross revenue. The State should share in the successes or losses of the utilities by the above-mentioned method of taxation. The companies should not be obliged to pay for paving or bridge construction; in short, it should not be called upon to bear any expense which does not jointly benefit the company and the car rider.

Indiana Merger Authorized

$6,000,000 Reduction in Stock Under Commission Ruling Approving Merger of Southern Indiana Lines

The order providing for merger of the Interstate Public Service Company and five other utilities in southern Indiana was issued by the Indiana Public Service Commission on March 4. Ira E. Guthrie, secretary and treasurer of the Interstate Public Service Company, said:

> The biggest thing in the decision of the commission is the condition imposed on the Public Service Company, requiring that the capital stock of the five merging concerns be reduced at least $6,000,000.
>
> It always has been the purpose of the Public Service Commission to reduce wherever possible the capital stock of utility companies. In granting the present merger they have required and will obtain a decrease of more than $1,000,000 in each of the merging companies.
>
> The present total capitalization of the five selling companies is $24,792,630. We intend to reduce this amount to $18,866,300 making a reduction in the capital stock alone of $5,926,330. In addition the current indebtedness of the five companies which totals $1,329,627, will be extinguished by the Interstate Public Service Company. Our assets after the merger will total approximately $17,000,000.
>
> The merger will mean a great deal to the Interstate Public Service Company, not only in increased assets brought about by purchase of the other companies, but in the absolute unity and control of railway facilities between Louisville and Indianapolis and the northern and southern parts of the states which the new system will afford us.
>
> The Interstate Public Service Company is absolutely sound financially. During the last year we spent more than $750,000 on improvements. We will be able to obtain greater credit than any or all of the other companies under separate control, and thus will be able to provide necessary repairs and improvements in many of the plants operated by the selling companies.
>
> Particularly will the merger benefit the railway service between Indianapolis and Louisville, for consolidation will put both the northern and southern ends of the system in absolute control and unity. Better service and improvements will be the natural result.

The five companies to be taken over by the Interstate Public Service Company are the Central Indiana Lighting Company, the Louisville & Northern Railway & Lighting Company, the Louisville & Southern Indiana Traction Company, United Gas & Electric Company and New Albany Water Works.

Attempt Made to Revive Blue Hill Line

A bill has been introduced in the Massachusetts Legislature to have the State, through the agency of the trustees operating the Boston Elevated Railway, assume the rehabilitation and resumption of service on that part of the old Blue Hill Street Railway which lies between the Mattapan terminus of the Boston Elevated and the Reservation road to Great Blue Hill, a distance of about 3½ miles. This is only a small section of the Blue Hill system.

Operation of the Blue Hill Street Railway was suspended some time ago, and the property was sold as junk in 1920, under foreclosure proceedings. The purchaser, however, has not yet removed the track or overhead line, and it is believed that this portion of it might be put in operating condition at a cost not exceeding $30,000 for purchase and about the same amount for rehabilitation.

Ten Years' Report

Results of Stotesbury-Mitten Management Made Public by Philadelphia Rapid Transit Company

The Philadelphia Rapid Transit Company has just issued a small pamphlet entitled "Philadelphia Rapid Transit, Stotesbury-Mitten Management, 1911-1920," giving some of the important results on that property during the past ten years.

It declares that in 1911, when Mr. Stotesbury was asked to rehabilitate the company and invited Mr. Mitten to become active head, the company was in bad condition. Under Mr. Mitten's contract, which was made to cover no specific period, but could be terminated at the close of any fiscal year upon three months' notice from either side, Mr. Mitten assumed responsibility for the company's rehabilitation. In December, 1920, a voting trust agreement, originally for five years and later extended, was dissolved. Today, the pamphlet says, no individual stockholder owns more than 6,400 shares, and three-fourths of the stockholders own 100 shares or less.

During the past ten years car capacity has increased from 67,908 seats in 1911 to 131,393 seats in 1920. The rides per capita have increased 74 per cent. The average speed of all cars has gone up from 7.97 m.p.h. in 1911 to 9.33 m.p.h. in 1920. The average accident costs during the period have been 3.41 per cent of the gross, as compared with a previous 6.08 per cent. The average fire insurance rate has been decreased from 50 cents to 17⅓ cents per $100 of insurance carried. The number of conductors and motormen has decreased from 7,424 to 6,025, although the receipts have increased from $18,400,000 to $38,000,000. The fixed charges have been reduced from 45.32 per cent of the gross to 24.93 per cent of the gross.

The present fare is 7 cents, with four tickets for 25 cents. Statistics in regard to rates of fare are shown in the accompanying table.

ANALYSIS OF PHILADELPHIA FARES 1910-1920

Calendar Year	Fare per Passenger, Cents	Total Passengers	3-Cent Exchange Points	3-Cent Exchange Passengers	3-Cent Exchange Per Cent Total	Free Transfer Points	Free Transfer Passengers	Free Transfer Per Cent Total
1910	4.13	445,599,008	655	21,285,569	4.78	210	67,281,688	15.10
1911	4.07	520,425,581	650	24,795,479	4.76	224	84,363,551	16.21
1912	4.03	553,471,846	648	25,684,710	4.64	240	93,072,322	16.81
1913	4.00	584,721,865	646	26,784,380	4.58	285	101,319,056	17.33
1914	3.95	585,364,297	641	27,119,544	4.63	310	107,908,712	18.43
1915	*3.91	598,111,900	636	27,221,924	4.55	312	114,620,321	19.16
1916	3.91	672,959,447	620	31,939,375	4.75	315	127,990,030	19.02
1917	3.91	731,470,879	602	36,710,434	5.02	317	136,595,637	18.68
1918	3.98	767,758,406	[illegible]	43,791,710	5.70	320	130,472,269	17,00
1919	3.98	872,755,398	536	51,675,791	5.92	333	149,427,164	17.12
1920	4.15	913,870,463	537	55,233,232	6.04	336	154,079,623	16.86
10 yrs.	3.99	6,800,910,082		350,956,579	5.16		1,199,848,685	17.64

*The low rate of 3.91 cents per passenger in 1915 was accomplished through the substitution of free transfers for 3-cent exchange tickets at the several points where they seemed most burdensome to the public, and the establishment of free transfer points at many places to overcome paying double fare; this rate increased to 3.98 cents in 1918 due to the lesser use of free transfers by transient riders during the war-time period.

Funds Provided for Improvements

The Ohio State Public Utilities Commission has advised William C. Culkins, director of street railways at Cincinnati, Ohio, that it has approved the application of the Cincinnati Traction Company for permission to issue $982,000 of securities for the purpose of providing funds to extend the Warsaw Avenue line and to make other improvements.

P. R. T. Nets $162,793 for January

The net income of the Philadelphia (Pa.) Rapid Transit Company for the month of January, 1921, as shown in the accompanying table, is $162,793, which is considerably less than the company's showing for the previous month, December, 1920, which was $427,494. However, it shows a marked improvement over the net income of January, 1920, which amounted to $51,163.

After deducting $125,000 to cover the monthly deduction to make a 5 per cent return on the outstanding stock there remains a surplus of $37,793 to credit against accumulated deficit of the year ended Dec. 31, 1920.

STATEMENT OF EARNINGS OF PHILADELPHIA RAPID TRANSIT COMPANY

Month Ended Jan. 31		1921	1920	Percentage Change over 1920
Operating revenue		$3,618,349	$3,043,258	18.9
Operation and taxes		2,670,905	2,215,477	20.6
Operating income		$947,443	$827,781	14.5
Non-operating income		37,591	39,987	—6.0
Gross income		$985,035	$867,768	13.5
Fixed charges		822,241	816,604	0.7
Net income		$162,793	$51,163	218.0
5 Per cent return on P. R. T. paid in capital—month of January, 1921	$125,000.00			
Amount by which gross revenues were insufficient to provide for operating expenses, taxes, fixed charges, and the 5 per cent return upon P. R. T. stock for the year ended Dec. 31, 1920	$1,117,934.77			
		$1,242,934		
Accumulated deficit for the thirteen-month period to January 31, 1921		$1,080,140		

Financial News Notes

Another Abandonment Proposed in New York.—The Belt Line Railway Corporation in Manhattan has served notice of its intention to abandon its 5 miles of line between Forty-second Street and Battery Place, New York City.

Sale Direct to People of Houston.—The Houston (Tex.) Electric Company will offer for sale to the people of Houston $250,000 of five-year notes bearing 8 per cent interest. The notes will be in denominations of $100, $500 and $1,000. The money raised by the sale of these notes will be used in construction of a double-track line on Fannin Street as the first step in the proposed removal of the tracks from Main Street. This is the first effort of the Houston traction company to sell its securities to the people of Houston.

San Francisco Road to Be Sold March 24.—Foreclosure sale of properties of United Railroads, San Francisco, Cal., is set for March 24. Under plan of reorganization properties are sold under foreclosure on a technical default of interest on one of the underlying bond issues and will be bought in by Market Street Railway. Upon consummation of the sale United Railroads will be merged with Market Street Railway, whose name the reorganized company will take. It is stated that new securities authorized under the plan will be issued immediately after the foreclosure sale has taken place. The plans for the reorganization of the company and the scaling down of present capitalization have been reviewed previously in the ELECTRIC RAILWAY JOURNAL.

Charter Application Withdrawn.—The application of the British Columbia Electric Railway, Vancouver, B. C., for a federal charter, thereby bringing the company's railway, light and power lines in Vancouver and Victoria under the Board of Railway Commissioners, has been temporarily withdrawn by the company pending a settlement with the municipalities. The various councils have tentatively agreed to permit the present fares to be charged until July 1, 1922, and not to press for a return to the franchise fares. Provided by-laws to this effect are passed by each city and municipality served, the company agrees to withdraw its application for a federal charter, but within six months new agreements must be entered into with the view of adjusting the company's rates and fares on a stable basis. Failing such agreements, the company may reinstate its application for a federal charter. The plan has been referred to previously in the ELECTRIC RAILWAY JOURNAL.

Traffic and Transportation

New Railroad Shelter

Milwaukee Company Takes Advantage of Street Construction to Provide for Its Patrons

In order to afford greater protection to travelers arriving in Milwaukee via the Chicago & Northwestern Railway and using the city cars of the Milwaukee Electric Railway & Light Company the latter company has erected outside the railroad station the shelter shown in the accompanying illustration.

The shelter, of steel with a red tile roof, is approximately 100 ft. long. It covers the width of the sidewalk. It is equipped with electric lights and is connected with the company's dispatching phone system. A covered and lighted passageway has also been erected, leading from the railroad station to the shelter, so that arriving or departing travelers using the street cars can enter or leave the station without being exposed to inclement weather. A supervisor is in attendance at the station familiar with the city to direct travelers who desire to use the street cars.

SHELTER IN MILWAUKEE—NEW FACILITY FOR TRAVELERS

The Northwestern Depot, as it is familiarly known in Milwaukee, is located on the lake front at the corner of Wisconsin and Marshall Streets. It is served by the Twelfth, State and Clyborne Street car lines of the Milwaukee company. All three used to discharge and receive passengers at the end of the line on Wisconsin Street in front of the depot entrance, and passengers had to walk into the middle of the street to reach the street cars. When street reconstruction work was recently performed in the vicinity of the depot the local railway constructed a loop around the block facing the depot and built the shelter on Marshall Street in front of the depot. Now all cars on the eastbound trip circle the loop, stop in front of the shelter to discharge and receive passengers and then turn into Wisconsin Street and proceed westbound into the city.

If permission can be obtained from the railroad it is planned to place one or two illuminated signs in the depot directing the traveler's attention to the street car facilities.

Co-operation of Public Invited to Keep Fares Down

In a pamphlet distributed to its railway patrons, entitled "Your Carfare" and "Let's Pull Together," the Tacoma Railway & Power Company, Tacoma, Wash., is appealing to the riding public to co-operate with it in solving the transportation problems. The objects to be accomplished, as set forth in the pamphlet, are "to increase the riding on cars," "to eliminate various practices and abuses which mean losses in earnings and increased cost of operating" and "to cut down those charges made against the company for the right to give service" and continue the present fare. The pamphlet says by way of introduction:

> Six months ago the Public Service Commission directed us to put into effect a tariff fixing cash fares at 10 cents and tickets at 8 cents. We had determined after intensive study of the railway situation in Tacoma, that a 10-cent straight fare was essential—but the commission did not see fit to grant such an increase. The result, over a period of six months, shows that a straight 10-cent fare would more nearly have met our financial needs.
>
> There are really two interested parties in this railway problem. You people who ride day after day, and the company itself.
>
> Both of us want to keep fares down.

Safety Campaign a Success

Co-operation in Portland, Ore., Has Brought About Material Reduction in Accidents

Splendid results have been achieved by the Portland Railway, Light & Power Company, Portland, Ore., in its intensive "Safety First" campaign, which has been continuously under way since January 7.

The first official check on the results of this test were compiled early in February by Fred Cooper, city superintendent, and show that the total number of traffic accidents of all kinds reported by the five divisions of the railway were reduced from a total of 743 during the month of December to 594 during the month of January, 1921. This is a net decrease of 149. This fine record was achieved through co-operation of the various departments of the railway, each department head being pledged to supervise the "Safety First" activity of his own staff and employees. A prize contest was conducted among the various divisions of the company for the best accident reduction record made day by day.

Divisions	No. of Accidents December, 1920	No. of Accidents January, 1921	Decrease
Piedmont.........	243	188	55
Savier............	161	130	31
Ankeny..........	192	150	42
Sellwood.........	129	113	16
Interurban.......	18	13	5
Total..........	743	594	149

The accompanying table shows the comparative accident records for the months of December and January.

SPLENDID CO-OPERATION SHOWN

One of the interesting phases of the campaign lies in the fact that automobile drivers of the city seem to have caught the spirit and exerted greater effort toward making a better record. The company's report shows that during December, 120 automobiles bumped into street cars, while in January the number of accidents of this type dropped off to 97.

Reports kept by the employees of the car company on traffic accidents in which the company's cars were not involved also show that there was a substantial reduction. This class of accidents was reduced from twenty-seven in December to thirteen in the month of January. The schools in Portland have also taken an active interest in this subject and have worked with the railway for clean accident records. A booklet entitled "Course of Study for Safety Education in Oregon Schools" has been adopted by the state for use in all schools. This booklet was compiled by H. H. Herdman, the general manager of the National Safety Council of the Oregon and Columbia Basin Division, located at Portland.

The safety work in Portland is in the hands of men of high standing in the community who have the spirit at heart with the will and financial support behind them to make it a real, practical thing.

$335,771 Loss in Operation in Davenport

Rates in Iowa City Go Before Court for Settlement Following the City Council's Refusal to Keep Its Promises

Chance of peaceably settling utility rate problems at Davenport, Iowa, were uined during the week ended March 5 when the Socialist majority in the City ouncil voted down a compromise settlement which had been recommended or passage by the city attorney, himself a Socialist, legal counsel specially ngaged, and Auditor J. M. McShane of Kansas City.

THIS refusal forces the rate problems into the courts, a proceeding which the Tri-City Railway & ight Company had hoped to avoid. It so caused the withdrawal from the case f Henry Vollmer, the city special legal unsel. In a public announcement At- rney Vollmer declared the traction nes were bankrupt according to the nding of the audit. He held that onomies in operation, such as the one- an car and elimination of duplicating ackage, were mandatory. The recom- endations of the city's special counsel ere based on the comprehensive re- rt of Auditor McShane and appraisal y Burns & McDonnell, Kansas City.

Compilation of these reports has ken six months. The work was un- rtaken at the order of the Socialist ajority in the Council, who wished to ve figures for their rate fight against e corporation. When the reports ere published it was found that the gures favored the company rather an the city and that higher instead of wer rates were justified.

Some of the figures the Socialists ve not yet divulged. These hidden gures are the present day reproduction st, present day reproduction cost de- eciated, and the rates for street car des, gas, electricity, power and steam sed on these valuations.

The valuations which the Socialists d divulge were costs based on the last n-year average, cost based on ten- ar average depreciated and rates sed on these valuations. Even these ures indicated the company's rates re too low.

COURT WILL HEAR RAILWAY PLEA

Now that the case is going to the urts the company will plead that tes be fixed on present day repro- ction cost depreciated.

Minority members of the Council arged the Socialist majority with bad ith when the compromise rate plan s voted down. They stated that the cialists had agreed to stand by the ures of the audit, whatever they re.

The present fare is 9 cents, with ee tickets for 25 cents, which has eraged 8½ cents in operation. The ditor's report showed the company d lost $335,771 for the year ended ne 1, 1920, and should have had a e of $0.089 during that period. In t period a 5 and 7-cent fare was in ect. Since that time trainmen's ges have been raised approximately ,000 a year.

The compromise plan held for a rate 8 cents, with two tickets for 15 cents, d provided for one-man car operation, elimination of duplicating lines, elimination of jitney bus competition, various operation economies, such as shortening of loops, and also pledged the city not to increase the company's taxes unjustly.

COMPANY WILL PLEAD FOR RELIEF

There has been no official confirmation of this report, but it is now believed that a 10-cent fare, one-man cars, a drastic cut in operation and dead trackage will be the main points of the company's court case. As the company is already in the courts and present fares are in force by injunction sanction the line of action will be making the present injunction permanent and incorporating in the permanent court order provisions for additional relief.

Company Delays Ten-Cent Fare

The Trenton & Mercer County Traction Corporation, Trenton, N. J., has announced that it will not put into effect the 10-cent fare which it is now privileged to charge in the place of 7 cents. The company applied for an increased rate to the old board of utility commissioners last November. The application was suspended for three months. This period expired several days ago. In the meantime the members of the old utility board were ousted from office. The application of the Trenton corporation automatically became effective at the end of the three months' suspension period.

The protracted wrangle between Governor Edwards and the Senate over the utility board, and the fact that the State has been without a commission since Dec. 27, when the Supreme Court upheld the Governor's right to oust the old board, leaves the company in the peculiar position of deciding for itself whether the 10-cent fare should go into effect. President Rankin Johnson takes the position that the 10-cent fare is absolutely necessary if the company is to continue to operate. The utility law has since been amended and new appointments are expected shortly.

Louisville Petition to Be Abridged

Judge Walter Evans in the U. S. District Court at Louisville, Ky., has ordered the Louisville Railway to trim down its petition bill in which the company seeks to make permanent the injunction restraining the city from interfering with the railway collecting a 7-cent fare. According to the court opinions contained in the bill, from the Louisville Auto Club, Board of Trade, Engineers and Architects Club and numerous others, as well as a long recitation of fares paid and conditions in other cities, are irrelevant to the case in hand, which should be made to conform with the equity rules. The railway has until March 11 to amend its petition.

CITY WILL FILE BRIEF

The city of Louisville expects to file a brief in the U. S. Court of Appeals at Cincinnati on March 7 with the hope of getting the appeal heard before March 19, on which date the court will adjourn until April 5. An effort is being made by the city to get immediate disposal of the suit and to secure an order from the Cincinnati court, forcing the railway to give receipts for overpayments in fare, until the case is decided.

It is shown that for the first four days under the 7-cent fare the average increase in earnings was 18.49 per cent.

Longitudinal Seats for Safeties

A few weeks ago the City Commission of Trenton, N. J., called upon Peter Witt to assist in solving the service difficulties of the Trenton & Mercer County Traction Corporation and to recommend improvements. During the investigation the Birney safety car was subjected to criticism. The chief difficulty was found to lie in the time lost in loading and unloading at heavy traffic centers. The narrow aisle in this type of car renders it difficult for passengers to make their way from the rear and alight at the front when the car contained a load of from forty-five to fifty passengers. This difficulty discouraged riders from moving to the rear and resulted in further aggravating the situation by massing large numbers at the front end of the car.

Many suggestions were made for remodeling the one-man car, and one, that of changing the cross seats to longitudinal seats, is being tried. A car has been remodeled and placed in service. All cross seats have been removed and a longitudinal seating running the entire length of the car body has been substituted. The seating capacity remains the same and the aisle width has been increased from 22 in. to 50 in. Six handstraps are attached to the roof ribs on each side of the car for the convenience of standing passengers. A slight relocation of the sanding box hoppers was also necessary.

The remodeled car has now been in service since the first week in February and public opinion is somewhat divided as to its suitability and no definite indorsement or disapproval has been made. From the operating department's point of view, however, this seating arrangement is ideal for the Birney car as it greatly facilitates the loading and unloading at times when the car has its maximum load of fifty passengers. Present indications are that this seating will be adopted for all Trenton cars in this class of service.

Expert Offers Solution

Suggests Bus-Trolley System at Bridgeport—New Relationship Would Mean Co-operation

Another solution of the Bridgeport trolley tangle was offered recently by John Bauer, New York, before the Bridgeport Chamber of Commerce. Mr. Bauer's scheme is a bus-trolley system under partially municipal management. He believes that a jitney-trolley combination would be a step toward solving not only the transportation problem in Bridgeport but in practically every city throughout the country. His first step would be a thorough investigation into the finances and operating costs of both the electric railways and jitneys by engineering and financial experts.

PLAN OF REORGANIZATION OUTLINED

In the matter of reorganization he suggested dividing the State of Connecticut into several railway districts with the establishment of a separate Bridgeport district. For this district a new operating company would be organized to lease all the railway lines in the district and to receive an exclusive bus franchise. The company should be directly controlled by a board of five directors consisting of one representative of the existing Connecticut Company, one representing the Public Utilities Commission, two from the city of Bridgeport and one representing other communities adjoining Bridgeport.

Mr. Bauer said that the crucial point in the reorganization would be the valuation on which the rentals were based. This should be determined according to present conditions, recognizing the buses as a factor, and that many existing railways will have to be abandoned or supplemented by buses. The new system would make provision for flexible fares and for any adjustment of fares that may be desired with changing conditions. Special provision of amortization of existing investment would also be made during the period of the lease so that at the termination the property would go free of further cost to the district. In conclusion Mr. Bauer said:

> The proposed system obviates the evils of direct municipal ownership and operation, but does maintain proper municipal control. It avoids also the evils of private ownership and financing and would place the transportation system upon a permanently solvent basis, with sufficient flexibility to provide for future needs of service and for an adjustable rate of fare according to changing conditions. When the proper relation of buses and street railways has been satisfactorily determined, there should not be competition between the two but co-ordination.

Paterson's Jitney Reply Unsatisfactory to Railway

The city of Paterson, N. J., has met the Public Service Railway's warning of withdrawal of service by declaring that the question of joint use of public streets by trolleys and jitney buses is one for state legislation and Public Utilities Board control.

The reply of Mayor Van Noort was as follows:

> As a result of a conference between the Mayor and the members of the Board of Public Works regarding the trolley-jitney question the following was the unanimous conclusion:
>
> The whole question of the joint use of public streets by the street railway and the jitney buses is a matter for state legislation and the control of the State Board of Public Utility Commissioners. Pending the passage of such legislation, and in order to relieve the present situation to some extent in our city, we propose the following action:
>
> No further jitney licenses shall be issued within the city limits, and any transfers which may be made in the future will involve the removal of the bus from the present lines to streets not directly competing with the railway.
>
> The belief of the Mayor and the members of the Board of Public Works is that this action will prevent any further addition to present congestion, and will, in the course of time, eliminate it.

As noted in the ELECTRIC RAILWAY JOURNAL for Feb. 26, page 423, President McCarter of the railway notified the Mayor that operation of the railway would be terminated unless the destructive competition of the jitneys was eliminated by the city authorities. The railway does not consider the reply of the Mayor to be satisfactory, but in view of legislation pending at Trenton under which a statewide policy of dealing with the jitney may be laid down, the railway company will await the result of action at the state Capitol at Trenton before it makes any further moves.

Cleveland Still Slashing Expenses in Effort to Break Even

Service on the lines of the Cleveland (Ohio) Railway is being slashed and further reductions in the salaries and wages of all officers and employees are contemplated, because of the fact that the company's interest fund, which is the fare barometer, has been completely wiped out and the company has no means of getting additional revenue as the highest rate of fare permitted under its franchise, 6 cents and 1 cent for transfer, is being charged at the present time.

The company's interest fund on May 1 a year ago contained $603,369. On Jan. 1 of this year, it contained only $39,913, and on Feb. 1 there was a deficit of $3,928 owing to the falling off in the number of passengers being handled by the company.

John J. Stanley, president of the company, and Fielder Sanders, City Street Railway Commissioner, both say that they do not desire any effort to be made at the present time to amend the franchise so as to boost the rate of fare above the 6-cent mark, but prefer to make use of both the alternatives of reducing the expenses and slashing service.

A 10 per cent reduction in wages went into effect on Feb. 1 for all officials and employees of the company, except motormen and conductors, who have an agreement on wages until May 1. The trainmen have already been informed, however, that on that date they will have to accept a 15 per cent reduction in pay.

Transportation
News Notes

Asks Two Fares.—Lindley M. Ga
son, receiver of the Brooklyn, Qu
County & Suburban Railroad, rece
applied to the Public Service Com
sion for permission to collect two f
on the Metropolitan Avenue sur
line between Flushing Avenue
Brooklyn and Jamaica Avenue
Queens. The receiver now wants
resume operation on that part of
line between Jamaica Avenue and
Metropolitan Avenue station of
Myrtle Avenue elevated railroad
Ridgewood and to make this a sec
fare zone.

Interurban Fares Advanced.—U
order of the Public Service Commis
increased passenger fares went
effect on March 1 on the Seattle-Re
interurban road operated by the P
Sound Electric Company. The
schedule of fares increases the ro
trip to Renton from 28 to 35 cents,
similar advances to other points on
line. Books of commutation tickets
sold at a reduction from the one-
fare. The new tariffs increase com
tation tickets for regular riders 10
cent and increase trip fares about
per cent.

Would Continue Zone Fares.—
Yonkers (N. Y.) Railroad has rece
applied to the Public Service Com
sion, Second District, for autho
from April 19, 1921, to continue to
lect fares on the present basis or
system. Besides the application of
Yonkers Railroad, similar requ
have been made by the Westche
Electric Railroad, and the New Y
Westchester & Connecticut Trac
Company. With the papers were
the amounts alleged to be deficits a
Dec. 31, 1920, as follows: Yonkers R
road, $1,239,143; Westchester Elec
Railroad, $1,614,015; New York, W
chester & Connecticut Traction C
pany, $98,398.

Seven Cents in Lafayette.—F
rates in the city of Lafayette, I
were increased on March 3 from 5 ce
to 7 cents by order of the Indiana P
lic Service Commission. The incre
of 2 cents went into effect on Marc
at midnight and will remain until
ther order of the commission.
order also provides that four tick
should be sold for 25 cents. The
fayette Service Company, which op
ates the street car system in Lafaye
had asked for a cash fare of 10 ce
The company further is ordered to
with the commission and the city
ficials of Lafayette, every sixty days
report of its receipts. The Lafaye
petition for increased rates was refer
to in the ELECTRIC RAILWAY JOURN
issue of March 5.

Personal Mention

Mr. Kipp Succeeds Mr. Beason on Utah Road

Ross Beason, traffic manager of the Salt Lake & Utah Railroad Company, Salt Lake City, Utah, which is generally known as the Orem electric line, resigned his position with that company on March 1 to engage in the investment banking business. He will head the newly organized firm of Ross Beason & Company, with offices in Salt Lake City and New York. The new firm will confine its activities to the purchase and sale of railroad, utility and government bonds. Mr. Beason, however, will continue to be identified with the Orem electric railroad, as vice-president and a director.

Mr. Beason has been with the Orem lines for seven years. He is a native of Birmingham, Ala., and went to Salt Lake City in 1912. He was at first connected with the Denver & Rio Grande freight department in Salt Lake, and after a few months became traveling freight agent of the Rock Island lines. After a year with this road he became identified with the organization of the traffic service bureau of Utah. He was manager of this bureau until 1914, when he went with the Orem lines.

Mr. Beason has been succeeded as traffic manager of the Orem lines by A. V. Kipp, formerly general freight and passenger agent. The position which Mr. Kipp vacates has been abolished.

J. F. Keate, who has been chief clerk for the railroad company in the traffic department for some time, has been promoted to commercial agent.

Mr. Whitley Succeeded by Banker

C. W. Whitley, who recently resigned as president of the Utah Light & Traction Company, Salt Lake City, Utah, has been succeeded by E. O. Howard. Mr. Whitley, who was formerly general manager of the American Smelting & Refining Company, a Guggenheim property, has left the railway field and has recently been promoted to a broader field of activity with the head offices of the Guggenheim interests in New York.

Mr. Howard is president of Walker Brothers, bankers of Salt Lake City, who have one of the largest and oldest banks in the West. He has been connected with this bank for a great many years and is one of Salt Lake City's most prominent business men. Mr. Howard's part in the administration of the traction company's affairs will probably not be very active, but he will serve in a more or less advisory capacity.

The Utah Light & Traction Company is a consolidation of the Utah Light & Railway Company and the Salt Lake City Light & Traction Company. The road operates about 146 miles of track and connects Salt Lake City with Murray, Sandy, Midvale and several other suburban towns.

Mr. Kelsey Wins Doherty Prize

E. R. Kelsey of the Toledo Railways & Light Company, Toledo, Ohio, recently received a pair of cuff buttons engraved with the Doherty emblem as the first prize from the Doherty Company for the best five-minute talk on thrift. Mr. Kelsey, himself an investor in Doherty securities, expresses his confidence in the following paragraph:

> The present is an especially favorable time for public utility stock investment, because of the new confidence people have in such business as shown by the favorable treatment accorded public utility companies almost everywhere by public service commissions and the general public. There can be no doubt but that an era of fair play for our public service companies is dawning and that for the first time the people are beginning to realize the great worth of such companies.

Charles Lentz, chief dispatcher, succeeds Mr. Smith as trainmaster of the Indiana Service Corporation, Fort Wayne, Ind. David Overholtz of Logansport, for some time dispatcher on the Lafayette division, goes to Fort Wayne as chief dispatcher.

E. B. Harris, formerly clerk of the Riverside County (Cal.) board of supervisors, has joined the Los Angeles Railway as investigator of litigated cases. He succeeds J. H. Sheridan, who has been with the claim department for four years, and who is now transferred to the operating department to take charge of the employment and instruction work.

Karl B. Crawford, formerly superintendent of the Ohio Gas & Electric Company, Leetonia, Ohio, has been appointed superintendent of the Camaguey Electric Company, Camaguey, Cuba, which owns and operates the Camaguey Tramways Company. Previous to his service with the Ohio Gas & Electric Company, he was connected with the Electric Railway Improvement Company, Cleveland, Ohio, and the Westinghouse Electric & Manufacturing Company, East Pittsburg, Pa.

Frank A. Heermans of Mattoon, Ill., has been appointed assistant secretary of the Public Utilities Commission of Illinois to succeed G. E. Doying of Jacksonville, Ill. The resignation of Mr. Doying was made necessary following the organization of the Peoria-Springfield Motor Transit Company, in which he took a leading part. The Illinois public utility law prohibits any member or employee of the commission from holding at the same time a position with a public utility company.

Charles F. Muller, for the past four years assistant general manager of the Utah-Idaho Central Railroad, Ogden, Utah, has resigned. Mr. Muller has accepted a position with the Bee Hive Advertising Company at Salt Lake City as assistant general manager. Mr. Muller will be succeeded by David S. Romney, formerly traveling freight and passenger agent of the Bamberger Electric Railroad at Salt Lake City. Mr. Romney has been connected with the Bamberger road for the past seven years.

Obituary

Peter Buss, for many years supervising head of the buildings department of the Brooklyn Rapid Transit Company, died on Feb. 15, following an operation. Mr. Buss was born in 1860 in Emden, Germany, and formerly lived in Richmond, Staten Island, where he was a carpenter and builder. He entered the service of the Nassau Electric Railroad, Brooklyn, before its lease to the Brooklyn Rapid Transit Company.

Morton D. Dawson, one of the men who organized the Broad Ripple Traction Company, Indianapolis, Ind., died recently at his home in that city after an illness of several months. Mr. Dawson was for a number of years superintendent of the Broad Ripple Traction Company, a property now jointly operated by the Indianapolis Street Railway Company and the Union Traction Company. During the war Mr. Dawson served as an official on one of the draft boards in Marion County, Indiana. He was fifty-seven years old.

Dr. Charles H. Lemon, for more than twenty-five years chief surgeon of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., died suddenly on Feb. 22. Death was caused by a stroke of apoplexy which occurred while Dr. Lemon was being prepared for an operation for appendicitis. Dr. Lemon was born in Philadelphia in 1863. He attended the University of Pennsylvania and later studied medicine and surgery at the Rush Medical College, Chicago. Soon afterward he became connected with the Milwaukee Electric Railway & Light Company as chief surgeon. About ten years ago when the employees of the company organized the Employees' Mutual Benefit Association or the E. M. B. A., as it is familiarly known in Milwaukee, Dr. Lemon was chosen its medical director. Under his guidance and supervision this association achieved a foremost position with respect to the medical and surgical benefits given its members and their families. At present the staff of doctors and nurses cares for about twelve thousand persons. Dr. Lemon's work in industrial medicine and surgery had been largely along original lines and had served as a model for others.

pate purchasing any new ones to take their place. The company has not as yet decided whether it will be necessary to purchase any cars to replace those lost in the fire of March 4, described elsewhere this issue.

The United Railways of St. Louis, Mo., has not yet ordered new cars specifically to replace the 16 cars which were destroyed in the Debaliviere carhouse fire on Jan. 3. Indirectly, however, the place of the burned rolling stock is being taken by new cars which have for some time been turned out of the company's shops at the rate of about two a week.

Power Houses, Shops and Buildings

Harrisburg (Pa.) Railways.—The report of the Harrisburg Railways recently submitted at the stockholders' annual meeting outlined some necessary improvements and additions. It was suggested that two new boilers of not less than 600 hp. each be installed with a new generating unit of not less than 3,000 kw. capacity. It was also suggested that additional carhouse space be provided as the present facilities were not adequate to house all the company's cars.

Track and Roadway

Alabama Power Company, Attala, Ala.—The Alabama Power Company is making improvements on its Attala car line. Seventy-pound rails are replacing the old 40-lb. ones that were laid when the line was first built.

Meriden, New Britain & Hartford Street Railway, Hartford, Conn.—Since no one appeared in behalf of the Meriden, New Britain & Hartford Street Railway at a legislative hearing recently the charter for this proposed line from New Britain to Meriden through Kensington and the Cat Hold gap route will be permitted to lapse. The charter was first sought from the General Assembly about ten years ago.

Los Angeles (Cal.) Railway.—The Los Angeles Railway will soon begin relaying of tracks with heavier steel and new ties on Central Avenue between Fifth and Fourteenth Streets.

Los Angeles (Cal.) Railway.—A temporary track at one side of the street will be used by the Los Angeles (Cal.) Railway on Hoover Street from Slauson to Sixty-first Street during improvement and change of grade on the main double track. The emergency rail will be used to prevent delay.

Brooklyn, Queens County & Suburban Railroad, New York.—The Public Service Commission has issued an order to the receiver of the Brooklyn, Queens County & Suburban Railroad directing that the tracks of the company on Jamaica Avenue between Rockaway Avenue and Van Wyck Avenue in Queens be rebuilt with new rails. The work must be begun not later than April 1.

Professional Note

John F. Layng, for many years connected with the Railway & Traction Engineering Department of the General Electric Company, Schenectady, N. Y., is leaving manufacturing work to enter the consulting engineering field. His new connection, just announced, is as a partner in the firm of Hemphill & Wells, consulting engineers, New York City. Mr. Layng has been engaged in the electric railway business since 1889, having been at various times connected with operating companies, as well as with the General Electric Company and Westinghouse Electric & Manufacturing Company. During the past five years he has devoted his time to general electric railway analyses and the results of some of his work along these lines have been published in this paper. During the war he was engineer with the United States Fuel Administration in Washington, D. C., in charge of the electric railway fuel saving for the entire country. It was largely due to his efforts that the skip stop was so generally used.

Trade Notes

The Combustion Engineering Corporation, 11 Broadway, New York City, has established a branch office at 521 Candler Building, Atlanta, Ga., in charge of A. A. Hutchinson.

Thomas H. S. Andrews, M. E., until recently on the engineering staff of the J. G. White Engineering Corporation, is now identified with E. G. Long Company as its secretary.

The Maring Wire Company, Muskegon, Mich., manufacturer of cotton-covered and enameled magnet wire, announces the appointment of the Beedle Equipment Company as its representative. The Cincinnati office, at 1309-10 Union Trust Building, is in charge of A. L. Beedle. The Indianapolis office, at 509-10 Lemcke Building, is in charge of F. T. Miles.

Heywood Brothers & Wakefield Company of New Jersey, manufacturer of car seats, has reorganized under Massachusetts laws under the name of Heywood-Wakefield Company, with a capitalization of $13,000,000. The reorganization represents a merger with the Lloyd Manufacturing Company of Menominee, Mich., which manufactures baby carriages. Officers and directors of the company remain unchanged except that Henry Hornblower succeeds John D. Walsh, deceased, as director, and Marshall B. Lloyd is added to the board.

The Chicago Pneumatic Tool Company, New York City, announces the appointment, Jan. 1, 1921, of R. F. Eissler as assistant to the vice-president, with headquarters in the company's new office building at 6 East Forty-fourth Street, New York. W. C. Straub, formerly district manager of the New Orleans branch, has been appointed district manager of the Pittsburgh branch to succeed Mr. Eissler, and Ross Wyeth, formerly attached to the Pittsburgh branch, has been appointed district manager of the New Orleans office in place of Mr. Straub.

The International Clay Products Company, 31 Union Square, New York City has recently purchased the entire properties, plant, equipment, coal, clay and shale mines of the Clermont Sewer Pipe Company of Pennsylvania and the Kesco Clay Products Company of New Jersey. The Clermont plant covers 400 acres of land and has an annual capacity of 10,000,000 duct feet of clay conduit. Both plants are reported to be operating at full capacity, and complete stocks are carried for prompt shipment. In addition the company carries cable hangers, conduit coupling rods and pick-up tools.

The Westinghouse Air Brake Company, Wilmerding, Pa., announces the appointment of Alexander England as chief engineer to succeed S. W. Dudley, who resigned Feb. 1, to join the faculty of Yale University as professor of mechanical engineering. Mr. England came to the Westinghouse Air Brake Company in the year 1898. He was made chief draughtsman in 1905 and remained in that capacity until his appointment as assistant to Mr. Dudley in 1914. Other changes occurring as a result of Mr. Dudley's resignation and the promotion of Mr. England have been announced as follows: R. E. Miller, engineer of tests and inspection, promoted to superintendent of tests and inspection; W. E. Dean, assistant engineer of tests, promoted to engineer of tests, and A. A. Mackert, chief inspector, promoted to engineer of inspection.

New Advertising Literature

Valves. — The Yarnall-Waring Company, Chestnut Hill, Philadelphia, is distributing a leaflet describing its "Yarway" junior seatless valve.

Battery Test Chart. — The Allen-Bradley Company, Milwaukee, has published a new battery test chart, 14 in. x 31 in., to be used exclusively with the Allen-Bradley rate discharge test set.

Lightning Arresters.—Electric Service Supplies Company, Philadelphia, has issued bulletin No. 175, dated Feb. 15, a catalog of "Garton-Daniels and Keystone Lighting Protective Apparatus."

Portable Electric Grinders and Drills.—The Cincinnati Electrical Tool Company, Cincinnati, has issued catalog No. 14, covering its complete line of portable electrical drills, grinders and buffers.

Insulating Material. — The Boonton Rubber Manufacturing Company, Boonton, N. J., has published a forty-eight-page booklet entitled "Boonton Bakelite," in which it describes and illustrates the method of manufacturing bakelite and its uses.

Peacock Staffless Brake

WHEN the air fails—with the car on a steep grade and 70 or 80 passengers crowded aboard—the Peacock Staffless WILL HOLD IT! The stop will be sure—certain—GRADUATED—as will also the RELEASE. There is no doubt about Peacock action—no failure—the control of the car is perfect all the time.

The Peacock Staffless occupies half the space, weighs no more and gives 3 times the power of the ordinary hand brake. Specify it on your new cars.

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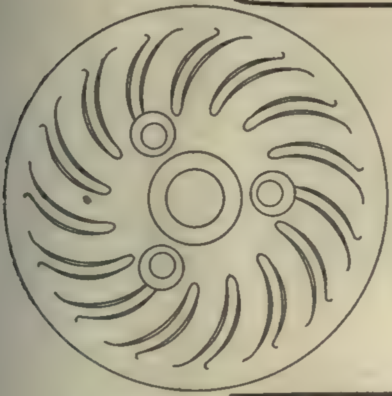

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In the first part of February, 1919, he was employed as running engineer for an Oxygen Producing Company in Pennsylvania. Like so many other men of technical or semi-technical training, he knew one department of industry so well that he seemed likely to be confined to that department permanently.

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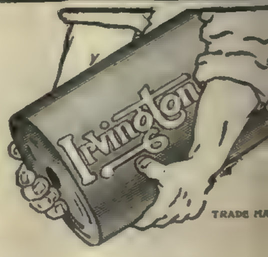

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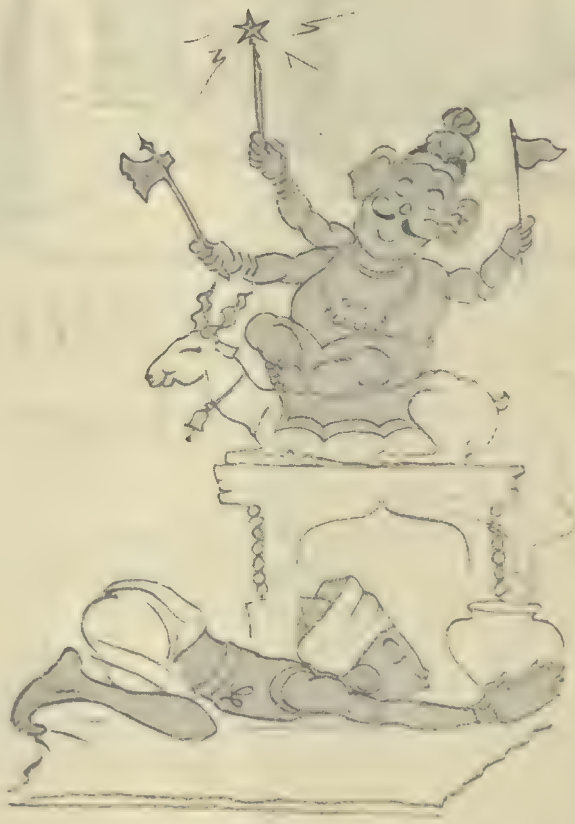

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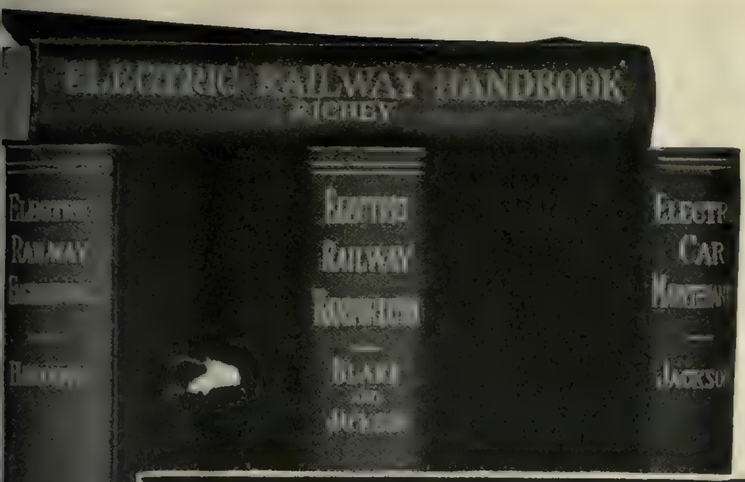

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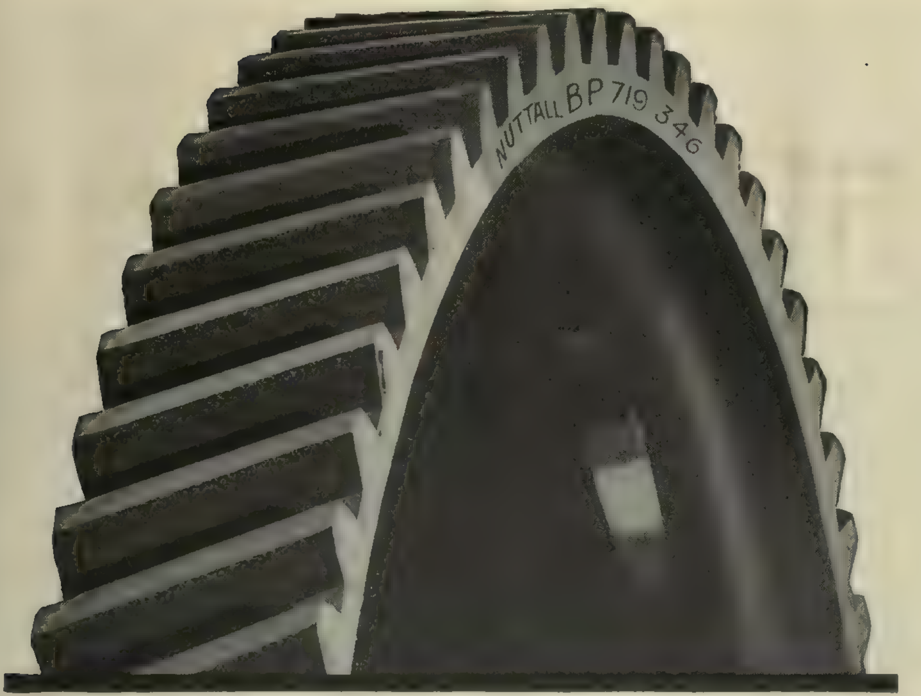

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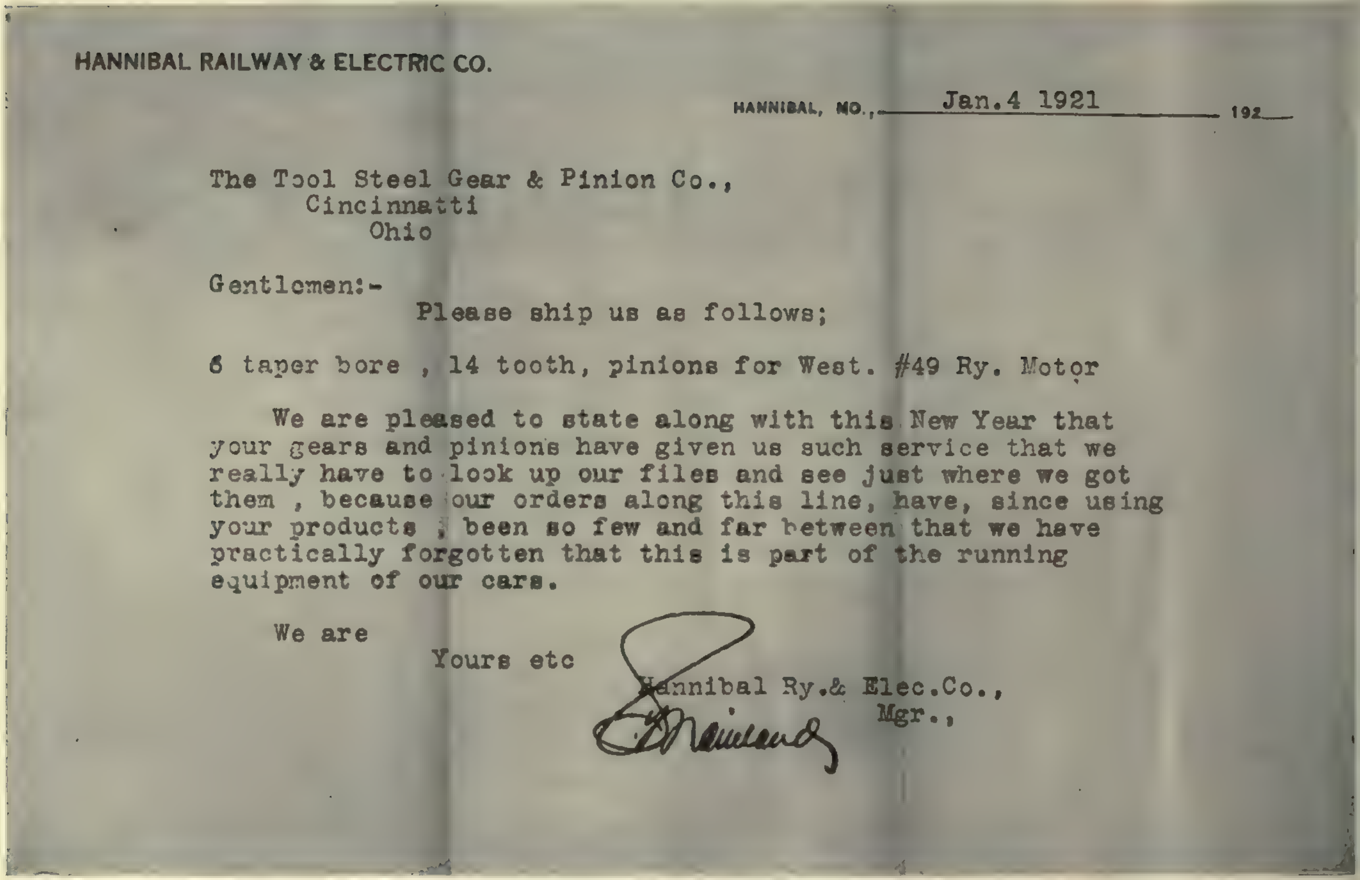

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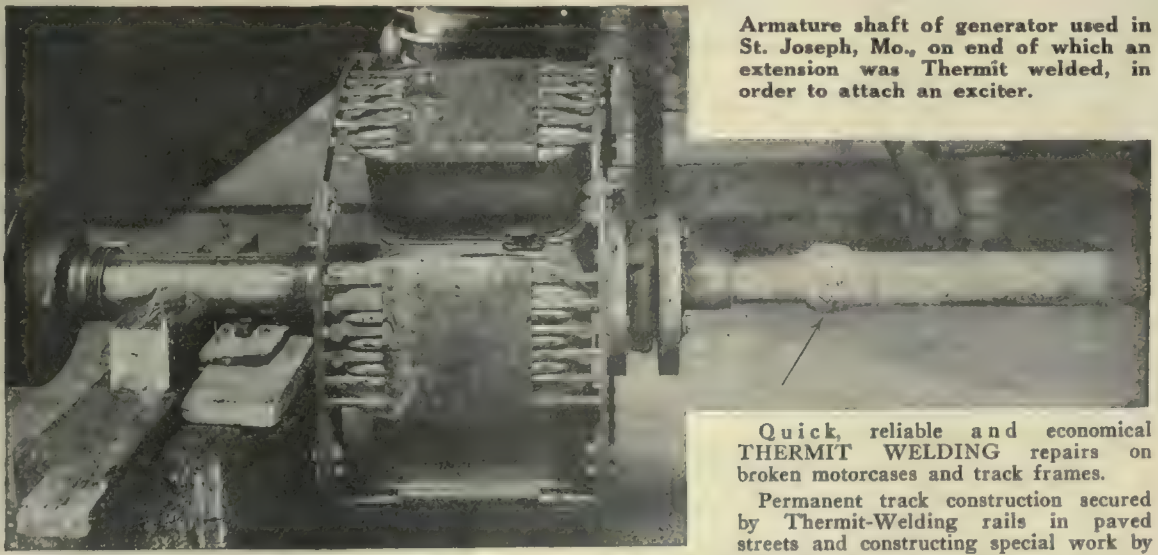

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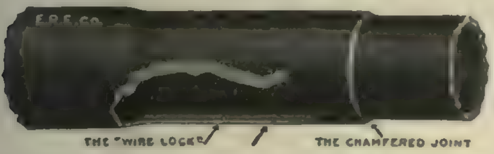

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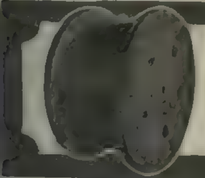

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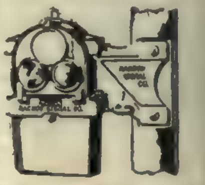
NEW YORK SALES OFFICE: 30 CHURCH STREET, NEW YORK CITY
COPPERWELD Wire—a non-corroding electrical conductor 8% Lighter—50% Stronger than Copper.

AUTOMATIC SIGNALS
for Electric Railways
Highway Crossing Bells
Headway Recorders
NACHOD SIGNAL COMPANY, Inc.
LOUISVILLE, KY.



Better High Tension Insulators
Advice, Estimates and Engineering Service on request
Jeffery-Dewitt Insulator Co.
Huntington, West Virginia

MAGNET WIRE

Cotton Covered

AN IMPORTANT feature in the manufacture of our cotton covered magnet wire is the proper selection of the cotton stock. Every bit of yarn is thoroughly tested in our laboratories to make certain that our rigid specifications for uniform first quality, long-fibre Sea Island cotton are met.

This care in selection applies as well to the copper conductor—round, square or rectangular. Only the best grade, conforming to Mathiessen's standard, is used.

These specifications, and the corresponding inspections, follow the wire during the course of manufacture until it is shipped, layered exactly on each spool, and well protected against rough handling during transportation.

Belden Manufacturing Company
Twenty-Third Street and Western Avenue
Chicago
Eastern Office and Warehouse: Metuchen, N. J.

In this small space
there are over a mile of

"ACME" (NESTABLE) CULVERTS

Anti-Corrosive Corrugated Galvanized

It is possible because "ACMES," when nested, occupy only about one-eighth as much space as full circle culverts.

This feature enables users to keep a large supply of "ACMES" on hand. They can easily be stored in a small shed or in one corner of a stockroom.

Write for delivered prices

The Canton Culvert & Silo Co., Canton, O.
Founders of the Nestable Culvert Industry

THE BABCOCK & WILCOX COMPANY STEAM

IN 1898
STEAM SUPERHEATERS

Were introduced commercially in the United States by this Company. Owners of boilers it has built—Babcock & Wilcox, Stirling and Rust—not now equipped with these coal-saving accessories can obtain information about superheating possibilities from the nearest office listed below.

THE BABCOCK & WILCOX COMPANY
85 LIBERTY STREET, NEW YORK

BOSTON, 49 Federal Street
PHILADELPHIA, North American Bldg.
PITTSBURGH, Farmers Deposit Bank Bldg.
CLEVELAND, Guardian Bldg.
CHICAGO, Marquette Building
CINCINNATI, Traction Bldg.
ATLANTA, Candler Bldg.
TUCSON, ARIZ., 21 So. Stone Avenue
NEW ORLEANS, 533 Baronne Street
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 705-6 Kearns Bldg.
HONOLULU, H. I., Castle & Cooke Bldg.
SAN FRANCISCO, Sheldon Bldg.
LOS ANGELES, 404-406 Central Bldg.
SEATTLE, L. C. Smith Bldg.
HAVANA, CUBA, Calle de Aguiar 104
HOUSTON, TEXAS, Southern Pacific Bldg.
SAN JUAN, PORTO RICO, Royal Bank Bldg

SPECIALISTS
in the
Design and Manufacture
of
Standard--Insulated—and Compromise Rail Joints.

The Rail Joint Company
61 Broadway, New York City

BARBOUR-STOCKWELL CO.
205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of
Special Work for Street Railways

Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

The Circuit Breaker with Brains

The Automatic Reclosing Circuit Breaker KNOWS When to Open and also When to Reclose AND DOES IT AUTOMATICALLY

The Automatic Reclosing Circuit Breaker Company
Columbus Ohio

For the sake of Complete Protection to your equipment and service
"Let's Get Acquainted"

NILES-BEMENT-POND CO.
111 BROADWAY, NEW YORK

MACHINE TOOLS
FOR ELECTRIC RAILWAYS

Axle Lathes
Wheel Presses
Car Wheel Lathes
Boring Mills
Lathes
Hammers
Cranes
General Machine Tools

WE CAN CUT YOUR COST OF HEATING CURRENT
Write for THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.
VENTILATORS Also Ventilate in Stormy Weather.
THERMOSTATS Save Current.
ORIGINATED the use of NON-CORROSIVE Wire for Electric Car Heaters.
ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS
Gold Car Heating & Lighting Co., 17 Battery Pl., New York

WE-FU-GO AND SCAIFE
WATER
PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES
WM.B.SCAIFE & SONS CO. PITTSBURGH, PA.

THE CUTTER ELECTRICAL AND MANUFACTURING CO. CIRCUIT I-T-E BREAKERS PHILADELPHIA

I. T. E.
Circuit Breakers
for heavy street railway work are the best obtainable. Write for New Complete Catalogue.

"UNION" FUSES
"Union" Renewable Fuses will save four-fifths of your fuse maintenance cost. Guaranteed to give satisfaction. Money back if they fail. Booklet on request.
CHICAGO FUSE MFG. CO.
Chicago New York

SPECIFY
THE TERRY TURBINE
For Driving Your Auxiliaries
TERRY STEAM TURBINE CO.
Hartford, Conn

CONDENSERS, SPRAY NOZZLES, VALVES, OIL BURNING EQUIPMENT, FEED WATER HEATERS, INJECTORS, Distillers, Oil Coolers, Chemical Equipment
Schutte & Koerting 1155 Thompson Street Philadelphia, Pa.

RAMAPO
Automatic Safety and Automatic Return Switch Stands for Passing Sidings. Tee Rail Special Work for Interurban Lines and Private Rights of Way. Manganese Construction a Specialty.
Ramapo Iron Works
HILLBURN, NEW YORK
Plants at Hillburn, N.Y. and Niagara Falls, N.Y. New York Office, 30 Church Street

FOSTER SUPERHEATERS
A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits
Power Specialty Company Boston Chicago Philadelphia San Francisco Pittsburgh London, Eng. 111 Broadway, New York

International Registers

International Fare Registers. Single registers, round and square; double registers, duplex counters, car fittings. Exclusive selling agents for HEEREN ENAMEL CAP AND COAT BADGES.

The International Register Co.
15 South Throop Street, Chicago

Type R5

Fare collection ceases to be a problem if your cars are equipped with CLEVELAND FARE BOXES. They meet all modern fare collection conditions.

The Cleveland Fare Box Company
Cleveland, Ohio

Canadian Branch: Preston, Ontario

They are uniform in quality

They talk for themselves

W. J. Jeandron
227 Fulton Street
New York City

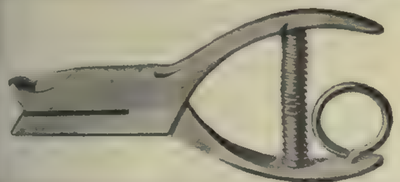
Pittsburgh Office:
636 Wabash Building

Canadian Distributors:
Lyman Tube & Supply Co., Ltd.
Montreal and Toronto

Use them in your terminals—
PEREY TURNSTILES or PASSIMETERS
Faster than the ticket seller
Perey Manufacturing Co., Inc.
30 Church Street, New York City

PROVIDENCE FENDERS **H-B LIFE GUARDS**

The Consolidated Car Fender Co, Providence, R. I.
Wendell & MacDuffie Co., 61 Broadway, New York
General Sales Agents



Economical in the Long Run

BONNEY-VEHSLAGE TOOL CO.
Newark, N. J.

BAKELITE-DILECTO

The fields of usefulness for Bakelite-Dilecto are many and varied because of its superior merit over materials heretofore available in sheets, tubes or rods. The exceptional qualities of Bakelite-Dilecto are satisfying electric railways all over the country. Investigate.

The Continental Fibre Co., Newark, Delaware
Branch Offices:
CHICAGO, 332 S. Michigan Ave. NEW YORK, 233 Broadway
Pittsburgh Office, 301 Fifth Ave. San Francisco Office, 525 Market St.
Los Angeles Office, 411 S. Main St.
Canadian Office, 1710 Royal Bank Bldg.,
Cor. King and Yonge Sts.
Toronto, Ont.,

Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost.

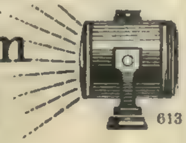
The Cooper Heater Company
Carlisle, Pa.

Electric car heaters—thermostatic control—pneumatic car door operators—buzzers, single-stroke bells, starting signal lights—special resistances.

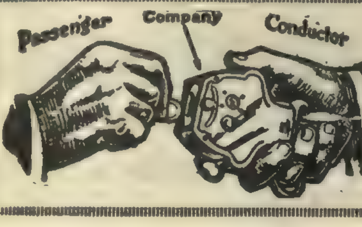
CONSOLIDATED CAR HEATING CO.
ALBANY, NEW YORK, CHICAGO

Compare Them

The faint light of a candle and the strong rays of a searchlight. They represent the comparative efficiency of other ways of finding what you want and advertising for it in the



SEARCHLIGHT SECTION
Employment Equipment Business Opportunities



Direct Automatic Registration By the Passenger

Rooke Automatic Register Co.
Providence, R. I.

ELECTRIC RAILWAY EQUIPMENT
for all classes of service

City and Interurban Cars and Trucks,
Snow Sweepers and Plows

Express, Combination and Work Cars,
Electric Locomotives

McGUIRE-CUMMINGS MFG. CO.
General Offices: 111 West Monroe St.
CHICAGO

ROLLWAY BEARINGS

For Journals and Motors of all types of railway cars. Particularly adapted to safety cars. Have been in satisfactory service for ten years.

They are oil and dust proof.

RAILWAY ROLLER BEARING CO.
Syracuse, N. Y.

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

SAMSON SPOT WATERPROOFED TROLLEY CORD

Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.
SAMSON CORDAGE WORKS, BOSTON, MASS.

Waterproofed Trolley Cord

SILVER LAKE A

Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER
SILVER LAKE

If you are not familiar with the quality you will be surprised at its ENDURANCE and ECONOMY

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY
Manufacturers of bell, signal and other cords.
Newtonville, Massachusetts

HASKELITE
The Plywood made with waterproof glue

An Engineering Material
used by car builders

for

Roofs
Side Panels
Headlining
Ceilings
Bottoms and Backs of Seats

Write for Samples and Prices

HASKELITE MANUFACTURING CORP.
133 W. Washington St., Chicago, Illinois

J.H.WILLIAMS & CO
"THE WRENCH PEOPLE"
Brooklyn · Buffalo · Chicago

FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK CO.
Second and Diamond Sts., Philadelphia

FORT PITT SPRING AND MANUFACTURING CO.
PITTSBURGH, PA.
Manufacturers of
COIL AND ELLIPTIC
SPRINGS
FOR
RAILWAY SERVICE

Compare Them

The faint light of a candle and the strong rays of a searchlight. They represent the comparative efficiency of other ways of finding what you want and advertising for it in the

SEARCHLIGHT SECTION
Employment Equipment Business Opportunities

ELECTRIC RAILWAY JOURNAL

Think "SEARCHLIGHT" First

ADVERTISING RATES

POSITIONS VACANT—Business Opportunities and other undisplayed ads, 8 cents a word, minimum $2.00 an insertion.

POSITIONS WANTED—Evening work wanted, tutoring and other undisplayed ads of individuals looking for employment, 4 cents a word, minimum 75 cents, payable in advance.

ADD 5 WORDS for box number in undisplayed ads if replies are to any of our offices. There is no extra charge for forwarding replies.

DISCOUNT OF 10% if one payment is made in advance for 4 consecutive insertions of undisplayed ad.

ADS IN DISPLAY TYPE—Space is sold by the inch (30 in. to a page), the price depending upon total space used within a year, some space to be used each issue.

RATE PER INCH for ads in display space:

1 to 3 in.	$4.50 an in.	15 to 29 in.	$3.90 an in.
4 to 7 in.	$4.30 an in.	30 to 49 in.	$3.80 an in.
8 to 14 in.	$4.10 an in.	50 to 99 in.	$3.70 an in.

POSITIONS VACANT

EMPLOYMENT

POSITIONS WANTED

POSITIONS VACANT

LAIM investigator and adjuster for small but growing public utility company in one of the large lake cities. State experience and salary expected. P-856, Elec. Ry. Journal, Leader-News Bldg., Cleveland.

POSITIONS WANTED

UDITOR, ten years' experience in street and interurban railway accounting familiar with interstate and state commission systems of accounts, desires change April 15th. Best references. PW-855, Elec. Ry. Journal.

ARN foreman with 20 years' experience, desires change of position. Have had extensive experience on construction and operation of high and low speed equipments and can guarantee complete satisfaction. PW-857, Elec. Ry. Journal.

LECTRICAL engineer with eight years' railway experience; three on power and substation equipment; three as master mechanic and two as general superintendent, seeks position, preferably as superintendent of small road. Aged 30; can supply the very best of references. Available immediately. PW-858, Elec. Ry. Journal.

XPERIENCED outside construction man desires position in way of electric railway, lighting, underground and submarine cables. Most experience in city of 200,000 population. Can produce results. PW-828, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

ASTER mechanic of proven ability, now employed, would consider making a change; 22 years' broad experience and splendid record in operation of all kinds of equipment on both city and interurban roads; first-class executive and very successful in dealing with employees. Present position and associates o.k., but desire broader opportunity. PW-851, Elec. Ry. Journal.

ASTER mechanic open for position, 18 years' experience in all departments, M. K. and H. L. control, can handle labor. A1 reference furnished. PW-859, Elec. Ry. Journal, Leader-News Bldg., Cleveland.

ITUATION wanted as claim agent or superintendent; fully experienced, 10 years' transportation, equipment, attorney; experienced state and federal courts. PW-852, Elec. Ry. Journal, Old Colony Bldg., Chicago.

UPERINTENDENT of transportation desires making a change, will consider any city or suburban property that requires a man of broad experience; age 40, clean and progressive; nearly 18 years' experience on large city and suburban properties; successful in dealing with public and labor, having a proven record as a transportation man who knows how to get results and build up; best of references. PW-860, Elec. Ry. Journal, Old Colony Bldg., Chicago.

In Replying to "Blind" Ads

be careful to put on envelope the key number in the ad and also local address of office to which reply is sent.

10th Ave. at 36th St., New York.
935 Real Estate Trust Bldg., Phila.
533 Leader-News Bldg., Cleveland.
1570 Old Colony Bldg., Chicago.
531 Rialto Bldg., San Francisco.

Important

Original letters of recommendation or other papers of value should not be enclosed to unknown correspondents — send copies.

0195

POSITIONS WANTED

VALUATION engineer, age 42; 10 years' experience in the appraisal of electric power companies and steam and electric railways; available after March 15; best reference. PW-853, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

YOUNG man, experienced as inspector, dispatcher, time tables and chief clerk in transportation department, now employed, desires change with chances for advancement. Prefer Middle West or South. PW-845, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

FOR SALE

Shares For Sale

10 shares Co-operative Society of America, $350; 10 Elgin Motor Co., $70. Phone, Englewood 187, L. J. Mather, 6807 Union Ave., Chicago, Ill.

WANTED

Prices on 2—B. & W. Water Tube Boilers 520 Horse Power, 18 Tubes wide, 14 Tubes high, 200 lb. pressure, or Edgemoor Boilers about 510 Horse Power, 17 Tubes wide, 15 Tubes high, both with 125 degree Superheaters and Underfeed Stokers. All of above must be in first-class condition.

Lexington Utilities Co.
Lexington, Kentucky

FOR SALE

POWER PUNCH

1—American Transfer Foot, with V Shaped Die.

Used only five months—Good as new

The Youngstown Municipal Railway Co.
Youngstown, Ohio

WANTED

ROTARY CONVERTER

1—150 kw., for Electric Railway, complete with transformers to change 2300—60 cycle, 3 ph., A.C. to 575 D.C.

SUSQUEHANNA TRACTION CO.
Lock Haven, Pa.

700 tons new 9 in.

GIRDER RAIL

Penna. Steel Co. Section 228, 107 lb. to the yard. Attractive price upon application. Subject to R. W. Hunt & Company's Inspection. Prompt shipment.

H. M. FOSTER COMPANY
Continental Building, Baltimore, Md.

COMPLETE POWER PLANT

FOR SALE

- 1—500 h.p. Westinghouse Compound Engine, Direct Connected to 550 volt Generator.
- 2—200 h.p. Harrisburg Engines, Belt Connected to Westinghouse Generators.
- 1—B & W Boiler, 2 Keeler Boilers, Water Heaters, Pumps, Piping, Switchboards and etc.

All in first class operating condition. Immediate delivery. Make us an offer.

The Lewistown & Reedsville Electric Railway Co., Lewistown, Pa.

Railway Motors

Standardize your Equipments at Minimum Cost

TRANSIT EQUIPMENT CO.
501 Fifth Avenue, New York

WANTED

10—71 TOOTH SPLIT OR SOLID GEARS

TRANSIT EQUIPMENT COMPANY
501 Fifth Avenue, N. Y.

USED CARS

For every service.

TRANSIT EQUIPMENT CO.
501 Fifth Avenue, New York

FOR SALE

Eight G. E.

DYNAMOTORS

first-class condition. Car type 1200-600 V. 15 Amps.

Charleston Interurban Railroad Co.
Charleston, W. Va.

New—Used—Rebuilt

MACHINERY AND SUPPLIES
for construction and industrial work

READING ENGINEERING CO., INC.
154 Nassau St., New York

EVERYTHING FOR TRACK

New and Relaying Rail

FITTINGS AND TOOLS

TRACK SPECIALTIES CO.
29 Broadway, New York City.

---

100 Westinghouse 56

MOTORS

Complete. Just taken out of service.

Philadelphia Rapid Transit Company
Purchasing Department
820 Dauphin Street, Philadelphia, Pa.

For 20 Years

we have been

Buying and Selling

Second-Hand Cars

Trucks and Motors

At Your Service

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

FOR SALE

New Copper Wire

Surplus stock approximately 16,000 lbs. No. 6—7/061 stranded medium hard drawn bare copper cable on original reels about 1,200 lbs. each at attractive price; all or any part.

JACKSON P. DICK, P. A.

Georgia Railway & Power Co.
Atlanta, Ga.

MAKE US A PRICE

On 70 Stationary Screens for Intake

Size 6 ft. 8 in. x 6 ft. 9 in. High
Frame 6 in. channel
Mesh ½ in. No. 10 galvanized
also
4 screens
Sizes 6 ft. 8 in. x 3 ft. 6 in. High

These screens are well made and are ready for immediate delivery from our West End Station, Cincinnati, Ohio.

The Union Gas & Electric Co.
Cincinnati

NEW
REBUILT **ELECTRIC MOTORS** REWINDING
REPAIRING

NEW A.C. MOTORS ¼ to 15 H.P.—LARGE STOCK USED MOTORS
EXCELLENT REPAIR SERVICE ON ANY SIZE OR TYPE

CLEVELAND ARMATURE WORKS, INC.

EST. 1895 4732-4-6 ST. CLAIR AVE., CLEVELAND O. *INC. 1918*

A&B

Machinery in Stock *for* *Immediate Shipment*

A&B

ROTARY CONVERTERS

1—500 kw. Westg. 6 ph., 25 cy., 440 v., A.C.; 600 v. D.C., 500 r.p.m.
1—500 kw. G. E. 600 v. D.C., 3 ph. 60 cy.
2—200 kw. G. E. 25 cy. 370 v. A.C., 600 v. D.C., 750 r.p.m.
1—150 kw. Westg. 3 ph. 60 cy. 370 v. A.C., 575 v. D.C., 720 r.p.m.
2—150 kw. G. E. 25 cy., 370 v. A.C.; 600 v. D.C., 750 r.p.m.

FREQUENCY CHANGER SETS

1—500 kw. G. E. 3 ph., 60 cy., 2300 v., 750 r.p.m. generator dir. ctd. to 700 hp., 3 ph., 25 cy., 13200 v., 750 r.p.m. motor.
1—500 kw. G. E. 3 ph. 60 cy. 2300 v. 300 r.p.m. generator dir. ctd. to 800 hp. 3 ph. 25 cy. 2300 v. 300 r.p.m. motor.

ARCHER & BALDWIN, Inc.
114-118 Liberty St., New York City
Tel.: 4337-8 Rector

Some One Wants to Buy

the equipment or machinery that you are not now using.

This may be occupying valuable space, collecting dust, rust and hard knocks in your shops and yards.

Sell it *Before* depreciation *Scraps* it.

0178

IF YOU CAN'T USE IT

Sell It

The equipment you do not need can usually render good service elsewhere. You can reach the largest group of buyers of such equipment at small cost through an ad in the

SEARCHLIGHT SECTION

For Every Business Want
"Think* SEARCHLIGHT *First"

0155

NEW—80-LB. RAIL and ACCESSORIES

Angle Bars, Spikes, Bolts and Nuts Complete

FOR SALE

A.R.A. "TYPE B" RAIL

Approximately 30,000 gross tons—standard lengths

Stored at Kearney, New Jersey

We buy electric and steam railways that are to be dismantled

HYMAN-MICHAELS COMPANY

NEW AND RELAYING RAILS

Peoples Gas Building, Chicago, Ill.

New York Office:
1324-1326 Woolworth Bldg.

Pittsburgh Office:
1312 First National Bank Bldg.

St. Louis Office:
2115 Railway Exchange Bldg.

Service Value

Scrap value for idle used machinery or surplus material is not enough. If it can be used by others they will pay *service value* for it. "Searchlight" will find these buyers for you.

Manufacturers who accept used machinery in part payment for new can dispose of it promptly by advertising in the Searchlight Section.

Machinery used in manufacturing and displaced by other equipment can be sold at a fair price by advertising it in the Searchlight Section.

Wide-awake dealers, agents or representatives can be secured through little Searchlight "Want" ads.

Manufacturing sites, partners, help, capital —anything that anybody in the machinery field is likely to have for sale or exchange for something else—can be located or disposed of through the Searchlight Section.

The cost of putting your Wants in this projector is very slight, whether for a man, for a job or for a market.

Searchlight Section

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Aftercoolers
Ingersoll-Rand Co.

Air Receivers
Ingersoll-Rand Co.

Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Angle Bars
Lackawanna Steel Co.

Automobiles and Buses
Brill Co., The J. G.

Axles
Bemis Car Truck Co.
Carnegie Steel Co.
St. Louis Car Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Standard Steel Works Co.
Westinghouse Elec. & Mfg. Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Babbitt Metal
More-Jones Brass & Metal Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

Batteries, Storage
Electric Storage Battery Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
St. Louis Car Co.
Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bearings, Oilless, Graphite, Bronze and Wood
Bound Brook Oil-less Bearing Co.

Bearings, Roller and Ball
Gurney Ball Bearing Co.
Railway Roller Bearing Co.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail
Niles-Bement-Pond Co.

Boilers
Babcock & Wilcox Co.

Boiler Tubes
National Tube Co.

Bond Testers
American Steel & Wire Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Ry. Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Ry. Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Book Publishers
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Boxes—Junction & Outlet
National Metal Molding Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
National Ry. Appliance Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Traction Brake Co.

Brooms, Track, Steel or Rattan
Zelnicker, W. A., Supply Co., Inc.

Brass and Bronze Products
American Copper Products Corp.

Brushes, Carbon
Corliss Carbon Co.
General Electric Co.
Jeandron, W. J.
Morganite Brush Co., Inc.
United States Graphite Co.
Westinghouse Elec. & Mfg. Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Bus Bars
American Copper Products Corp.

Bushings
National Metal Molding Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., J. G., The

Bushings, Graphite and Wooden
Bound Brook Oilless Bearing Co.

Cables (See Wires and Cables)

Cambric Tapes, Yellow and Black
Irvington Varnish & Insulator Co.

Cambric, Yellow and Black Varnished
Irvington Varnish & Insulator Co.

Carbon Brushes (See Brushes, Carbon)

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

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Electric Equipment Co.

Cars, Self-Propelled
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General Electric Co.

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Columbia M. W. & M. I. Co.
Eureka Co.

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Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
St. Louis Car Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Ackley Brake & Supply Corp.
Electric Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Ceiling, Car
Pantasote Co.

Circuit Breakers
Automatic Reclosing Circuit Breaker Co.
Cutter Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
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Electric Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.

Cleats
National Metal Molding Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Coin-Counting Machines
Electric Service Supplies Co.
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Johnson Fare Box Co.

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Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

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General Electric Co.

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Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

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Ingersoll-Rand Co.
Westinghouse Trac. Brake Co.

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Condensor Papers
Irvington Varnish & Insulator Co.

Condensers
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Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

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Westinghouse Elec. & Mfg Co.

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Russell Mfg. Co.

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General Electric Co.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

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Westinghouse Elec. & Mfg. Co

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General Electric Co.
Westinghouse Elec. & Mfg. Co.

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Copper Wire
Anaconda Copper Mining Co.
Copper Clad Steel Co.

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Electric Service Supplies Co.
International Register Co., The
Roebling's Sons Co., John A.
Samson Cordage Works
Silver Lake Co.

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Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Trac. Brake Co.

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Niles-Bement-Pond Co.

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International Steel Tie Co.

Crossing Signals (See Signals, Cro ing)

Crossings, Frog and Switch
Wharton, Jr., & Co., Wm.

Crossings, Track (See Track, Spec Work)

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Canton Culvert & Silo Co.

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Brill Co., The J. G.
Electric Service Supplies Co
Pantasote Co.
St. Louis Car Co.

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Archer & Baldwin
Electric Equipment Co.
Foster Co., L. B.
Hyman Michaels Co.

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Electric Service Supplies Co.

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Wish Service, P. Edward

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Williams & Co., J. H.

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National Pneumatic Co., Inc.
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Doors and Door Fixtures
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General Electric Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc

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Ingersoll-Rand Co.

Drills, Track
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Electric Service Supplies Co.
Niles-Bement-Pond Co.
Ohio Brass Co.

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Electric Service Supplies Co.
Zelnicker Supply Co., Inc., Walter A.

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Arnold Co., The
Beeler, John
Byllesby & Co., H. M.
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Feustel, Robert M.
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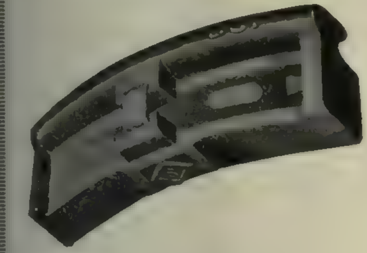

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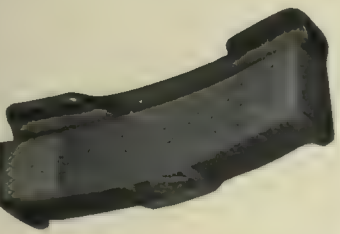

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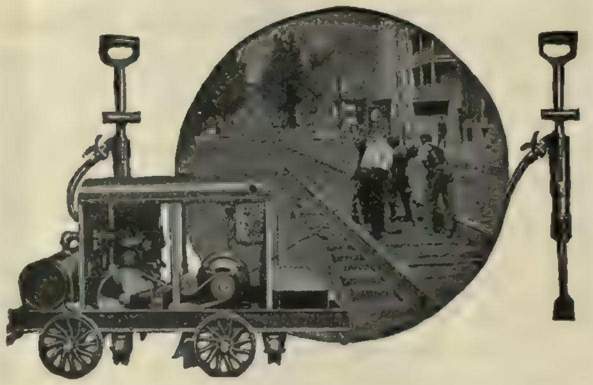

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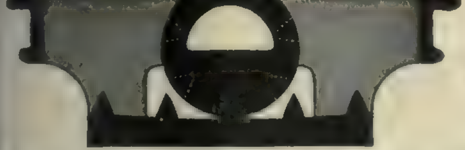

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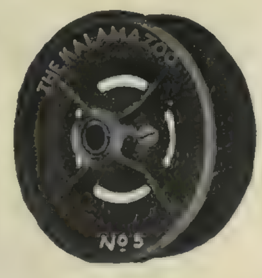

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Williams & Co., J. H.

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Westinghouse Traction Brake Co.

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Railway Track-work Co.

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Nuttall Co., R. D.
Star Brass Works

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General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

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Gold Car Heating & Lighting Co.
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Smith Heater Co., Peter.

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Cooper Heater Co.
Smith Heater Co. Peter

Heaters, Car (Stove)
Electric Service Supplies Co.
Smith Heater Co., Peter

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Ohio Brass Co.

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Inspection
Electrical Testing Lab's

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Hamilton Institute, Alex.

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Westinghouse Elec. & Mfg. Co.

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General Electric Co.
Standard Underground Cable Co.
Westinghouse Elec. & Mfg. Co.

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Irvington Varnish & Insulator Co.

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Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

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Electric Service Supplies Co.
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Ohio Brass Co.
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Hubbard & Co.

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Columbia M. W. & M. I. Co.

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Brill Co., J. G.
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Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

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General Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Signal and Marker
Ohio Brass Co.

Lathe Attachments
Williams & Co., J. H.

Lathes, Car Wheel
Niles-Bement-Pond Co.

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Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

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Columbia M. W. & M. I. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

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Texas Co.

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Wharton, Jr., & Co., Wm.

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National Metal Molding Co.

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Galef, J. L.

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Brill Co., J. G., The
Electric Service Supplies Co.
Wood Co., Chas. N.

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Westinghouse Elec. & Mfg. Co.

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General Electric Co.

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Hubbard & Co.
Lackawanna Steel Co.

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Schutte & Koerting Co.

Oils (See Lubricants)

Packing
Westinghouse Elec. & Mfg. Co.

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National Ry. Appliance Co.

Paving Material
American Brake Shoe & Fdry. Co.

Pickups, Trolley Wire
Electric Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co
Wood Co., Chas. N.

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Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Traction Brake Co.

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National Tube Co.

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Power Specialty Co.
Standard Steel Works Co.
Westinghouse Traction Brake Co.

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Electric Service Supplies Co.

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Page & Hill Co.
Southern Cypress Mfgrs. Assn.

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Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
National Tube Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Electric Railway Equipment Co.
National Tube Co.

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Page & Hill Co.

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Bonney-Vehslage Tool Co.
International Register Co., The
Wood Co., Chas. N.

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Zelnicker, Walter A., Supply Co. Inc.

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Electric Service Supplies Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

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Electric Service Supplies Co.
International Register Co., The
Rooke Automatic Register Co.

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American Steel & Wire Co.
Carnegie Steel Co.
Lackawanna Steel Co.

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Electric Service Supplies Co.

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Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

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Electric Service Supplies Co.

Resistance, Grid
Columbia M. W. & M. I. Co.

Resistance, Wire and Tube
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Westinghouse Elec. & Mfg. Co.

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Rheostats
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Westinghouse Elec. & Mfg. Co.

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Rosettes
National Metal Molding Co.

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Belden Mfg. Co.

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Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Ohio Brass Co.
St. Louis Car Co.

Sash Fixtures, Car
Brill Co., The J. G.

Scrapers, Track (See Cleaners and Scrapers, Track)

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St. Louis Car Co.

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Cleveland Armature Works
Hyman Michaels Co.
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Shades, Vestibule
Brill Co., The J. G

Shovels
Brill Co., The J. G.
Hubbard & Co.

Signals, Car Starting
Consolidated Car Heating Co.
Electric Service Supplies Co.
National Pneumatic Co., Inc.

Signal Systems, Block
Electric Service Supplies Co.
Nachod Signal Co., Inc.
U. S. Electric Signal Co.
Wood Co., Chas. N.

Signal Systems, Highway Crossing
Nachod Signal Co., Inc.
U. S. Electric Signal Co.

Slack Adjusters (See Brake Adjusters)

Slag
Carnegie Steel Co.

Sleet Wheels and Cutters
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Electric Railway Equipment Co.
Nuttall Co., R. D.

Snow-Plows, Sweepers and Brooms
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Fender Co.
McGuire-Cummings Mfg. Co.

Sockets & Receptacles
National Metal Molding Co.

Solderless Connectors
Frankel Connector Co.

Special Adhesive Papers
Irvington Varnish & Insulator Co.

Spikes
American Steel & Wire Co
Lackawanna Steel Co.

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Westinghouse Elec. & Mfg. Co.

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Schutte & Koerting Co.

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American Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Fort Pitt Spring & Mfg. Co.
Standard Steel Works Co.

Sprinklers, Track and Road
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Steel Castings
Wharton, Jr., & Co., Wm.

Steps, Car
American Mason Safety Tread Co.

Strand
Copper Clad Steel Co.
Roebling's Sons Co., J. A.

Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse Elec. & Mfg. Co.

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Babcock & Wilcox Co.
Power Specialty Co.

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Switches, Track (See Track Special Work)

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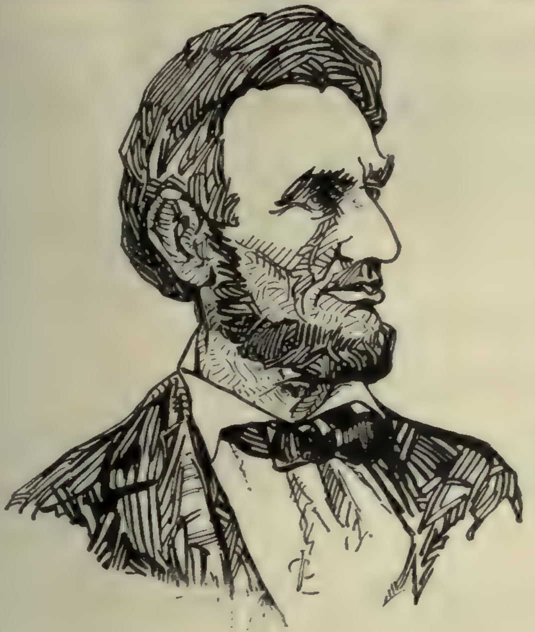

Lincoln used to tell the story of

the man who refused to mend a hole in the roof of his house. When it rained he couldn't and when the sun shone he didn't need to. And he wondered why people called him a failure.

A big company we know refused to advertise when business was bad—and when business picked up said there was no need to advertise.

Some day that company will be wondering why they failed to keep pace with their competitors.

The point is—

Keep Advertising in the

SEARCHLIGHT SECTION

0181

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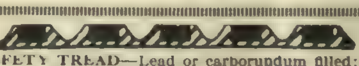

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But, in spite of all these increases, the Collier contracts made with you in days of low price operating cost are being fulfilled.

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Barron G. Collier
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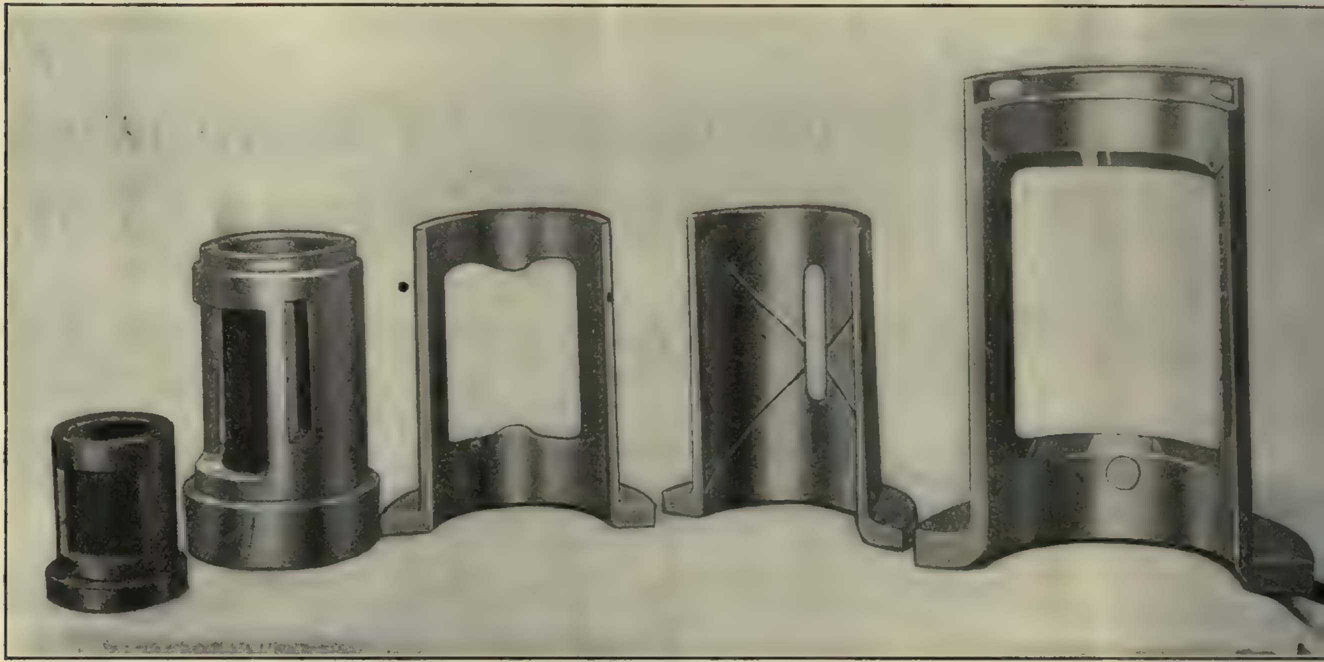

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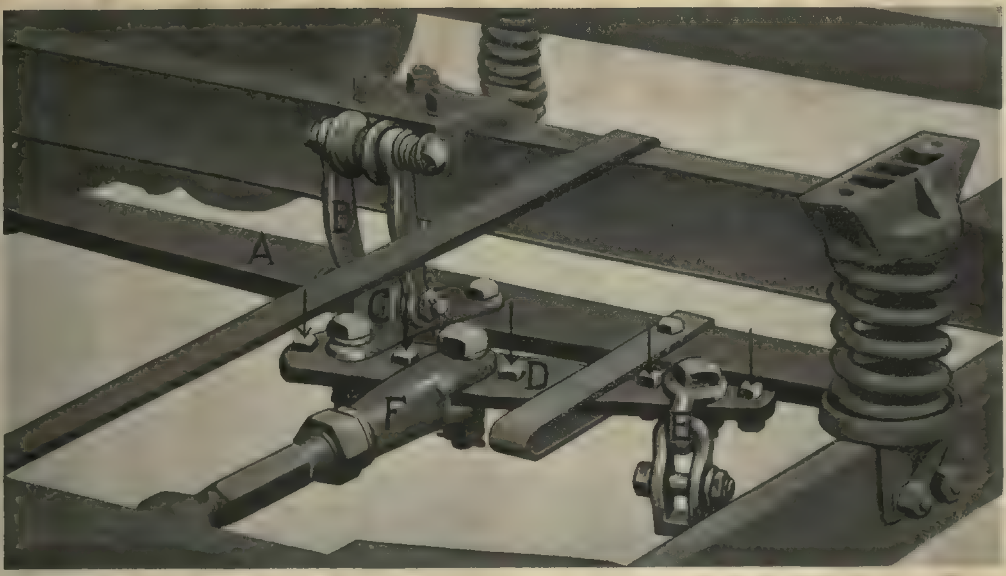

SAFETY BRILL FEATURES

BRAKE RIGGING OF BRILL 79-E TRUCK

Arranged so that the dropping out of any or all of the brake pins in the foundation brake rigging of this Standard Birney Safety Car Truck will not cause the brakes to fail when needed and result disastrously.

The bolts (indicated by arrows) on each side of each brake pin connecting the various parts to the brake pull lever (D) will hold the pull lever holder (C), bottom brake rod (F) and clevis (E) in place should the connecting brake pin fail or drop out. The pull lever holder is also connected to the brake beam (A) and is suspended from the truck crossing by the brake beam hanger (B).

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THE J. G. BRILL COMPANY
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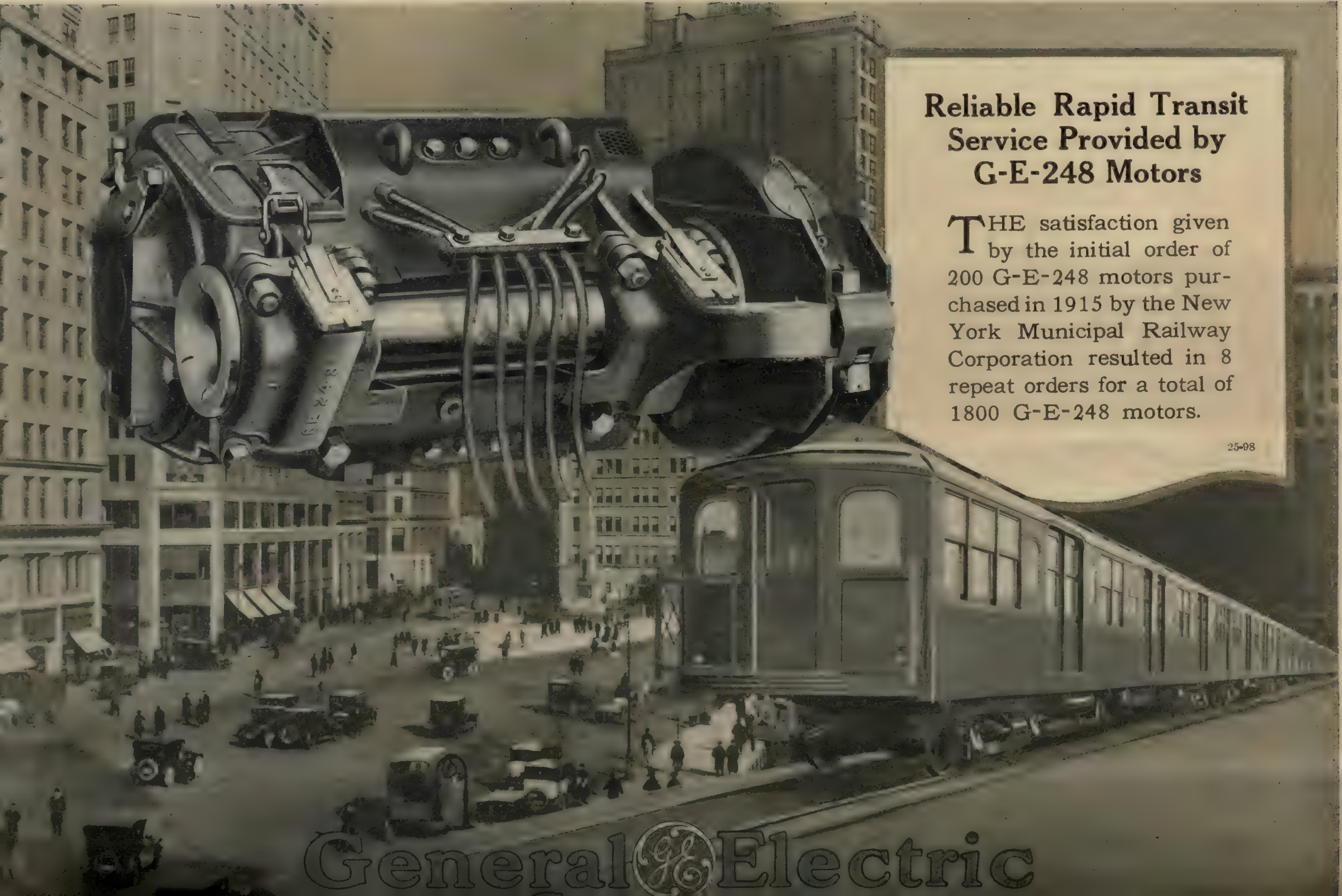

Reliable Rapid Transit Service Provided by G-E-248 Motors

THE satisfaction given by the initial order of 200 G-E-248 motors purchased in 1915 by the New York Municipal Railway Corporation resulted in 8 repeat orders for a total of 1800 G-E-248 motors.

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ANNUAL MAINTENANCE NUMBER

LECTRIC RAILWAY JOURNAL

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Assure Continued Reliability and Low Maintenance Cost

Wherever you find the older-type motors operating at reasonably low upkeep cost, you will find they have consistently used Westinghouse Repair Parts.

Why is this true? Simply because the Westinghouse engineering and research departments are just as keenly interested in the performance of their product after it is in service, as they are before it is sold.

Why not avail yourself of Westinghouse engineering talent? It will help you save thousands of dollars in maintenance by using repair parts that have a continued interest back of them.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Vol. 57, No. 12 New York, March 19, 1921 Pages 515-580

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing-Editor

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Utilizing Figures to Keep Down Costs 523

Mechanical department of New York State Railways rearranges data from auditor and storekeepers in special forms suitable for stimulating spirit of economy in shops and carhouses. Organization in divisions utilized to develop competition among several parts of property.

Portable Bond Tester 525

By G. H. McKelway.

The primary object of testing bonds is to locate those in poor condition, so that proper repairs can be made. Portable instruments afford the most effective means for this class of testing.

Premium Wage Plan in Milwaukee Shops 528

By J. H. Lucas.

Résumé of six years' experience with bonus pay for standardized jobs. The system is now applied to 50 per cent of the total time worked. It means better pay to the workmen and lower maintenance costs to the company.

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Chicago, Milwaukee & St. Paul Railway shops at Deer Lodge, Mont., maintain the locomotives on the Rocky Mountain and Missoula divisions. The routine procedure and some special problems are covered in this article.

Arc Welding and Motor Maintenance 537

Equipment men of the Electric Railways of Ohio, Pennsylvania and West Virginia gather for semi-annual exchange of experience. Considerable doubt of economy or safety of welded wheel flanges develops. Motor maintenance talk, illustrated with stereopticon slides, given.

Repair Concrete Paving by Novel Method 545

By R. C. Mills.

Old removed asphalt melted up to fill holes. Cheap, quick and apparently successful method of repair made possible through use of waste material.

Determining Forces in Brake Rigging 547

By H. M. P. Murphy.

With the air pressure in the brake cylinder or the force applied to the handle of a hand brake as the starting point, the author shows how the forces which are developed in all members of a foundation brake rigging are computed.

Cleaning Trucks for Overhaul 551

By Henry S. Day.

Large lye vat, into which whole truck frames are immersed, makes repair work quicker and more thorough. It has proved itself such a valuable aid that it has paid for the initial cost several times over. Workmen like it, as it makes their work easier and cleaner.

Equipment and Its Maintenance 553

Short descriptions of tools used together with mechanical and electrical practices of all departments to supplement the preceding longer articles.

Comments on Reducing Shop Costs 557

By J. M. Bosenbury.

Shops and shop organizations, responsible for a large share of the operating costs, should be thoroughly looked into to see how they can contribute to the reduction of expenditures.

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MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION 1921

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Circulation of this issue, 7,200 copies

Advertising Indexes—Alphabetical, 152; Classified, 144-146-148-150, Searchlight Section, 140-142

Here Are Some Maint Genuin

These figures were put before t Jan. 31-Feb. 1 meeting of the Can dian Electric Railway Associatio but they are important enough to r print and repeat for electric railw men in every country everywhe They surely answer the questio What about maintenance?

First, take an individual case reported directly by the operator himself, Mr. E. H. Weyman, Manager Levis County Railway, Levis, Quebec. His old cars were chiefly double-truckers of 40,000 lb. weight and 140 h.p., and about these he says: "Naturally the double-truck cars were responsible for very heavy peaks on the power system besides heavy maintenance of track and equipment. With the safeties we have lowered our peaks and CUT EVERYTHING ELSE I HALF, incidentally providing better acco modation and service."

In considering the following compariso please remember that the service is up hi sides so steep that there are grades up to 13 per cent, and that but 10 per cent or so the entire run is tangent track!

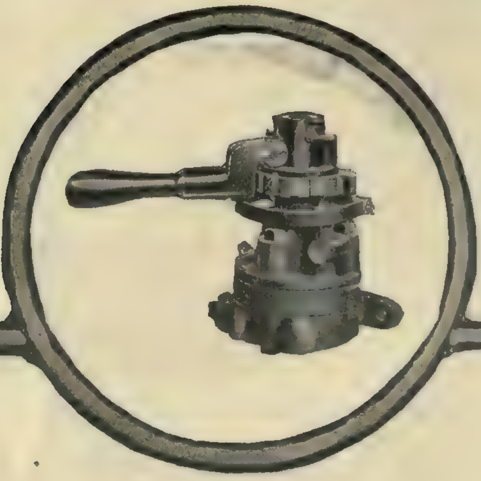
The Story in Overall Charges

	Safety Car Cents per Car-Mile	Old Cars Cents per Car-Mile
Carbody and truck	0.875	4.08
Electrical equipment	0.154	2.34
Air equipment	0.133	0.63
Total	1.16	7.05

The Story in Detail Supply Costs

	Safety Car Motor	Old Car Motor
Armature coils	$ 31	$ 40
Set of field coils	57	178
Commutator	43	60
Armature compl.	200	260
Gear	21	30

No Wonder Levis is Enthusiastic about the Safety Car



Safety Car Devices Compan
Boatmen's Bank Bldg., St. Louis
Chicago San Francisco New York Washington Pittsbu

ance Facts About the afety Car

Second, take the figures presented by Mr. H. L. Andrews, which include many properties where the replaced cars were lighter and less used than at Levis. They therefore may be offered as really conservative figures and the *least* the majority of roads could expect from a change to genuine safety car operation.

	Safety Cars Cents per Car-Mile	Double-truck Cars Cents per Car-Mile
Maintenance of way	1.6	3.3
Maintenance of equipment	1.7	3.6
Power	1.9	3.8
Transportation	8.4	13.9
General	2.4	3.2
	16.0	27.8

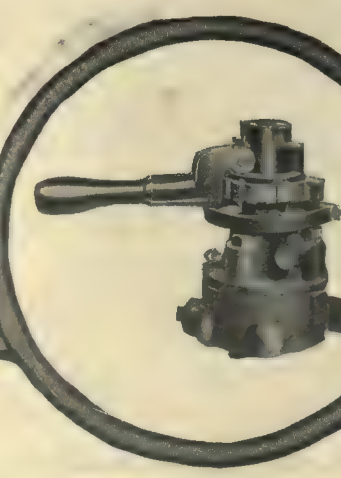
In a few words: The genuine Safety Car will cut your maintenance in half at least, while your total overall saving will be on the order of 43 per cent.

And for good measure, there is Fort Worth with its pioneer Safety Cars with four years of service to their credit. These cars have been operating at a cost of 1.9 cents per car-mile, which means an average

Reduction of 51 Per Cent in Maintenance Expense

Attained through the wise selection and consistent re-purchase of the genuine Safety Car, the only kind which comprises automatic laborless apparatus so interlocked that regardless of the illness, etc., or distraction of the operator, the power will be cut off instantaneously, the airbrakes and sander apply immediately thereafter, and the doors unlatch for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed and the step folded before the car can start, and when the airbrake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

Safety Car Devices Company
Boatmen's Bank Bldg., St. Louis
Chicago San Francisco New York Washington Pittsburgh



Facilitates Multiple-Unit Operation

A SAFETY DEVICE
A TIME SAVER

WESTINGHOUSE

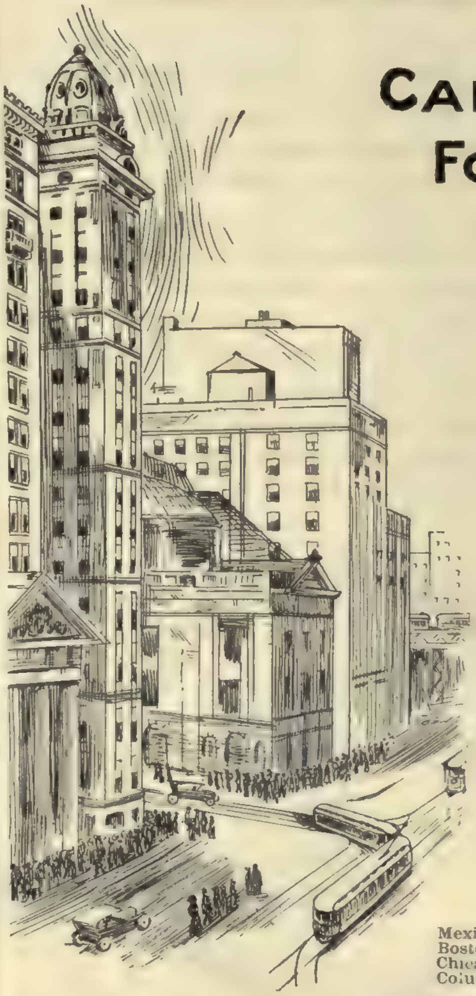
"Tight-Lock"
(AUTOMATIC)
CAR AND AIR COUPLER
FOR TRACTION SERVICE

It takes a good coupler to meet the exacting requirements of short headway, multiple-unit operation in the big, busy city of modern times. That is why the largest Electric Railways in the world specify "Westinghouse Tight-Lock."

This is the Car and Air Coupler that forms an absolutely rigid joint, locks with a grip that never yields, and establishes permanently perfect air connections for Air Brake operation. Made in heavy and light designs for all classes of service.

Westinghouse Traction Brake Co.
General Office and Works, Wilmerding, Pa.

Mexico City
Boston, Mass.
Chicago, Ill.
Columbus, O.
Denver, Colo.
Houston, Tex.
Los Angeles, Cal.
New York, N. Y.
Pittsburgh, Pa.
San Francisco, Cal.
Seattle, Wash.
St. Paul, Minn.
St. Louis, Mo.
Washington, D. C.



Tomlinson Spring Draw Bar Carriers take care of severe breaks in grade without undue strain on car sills

Pulling Crowds Over the Peak with Tomlinson Automatic Couplers

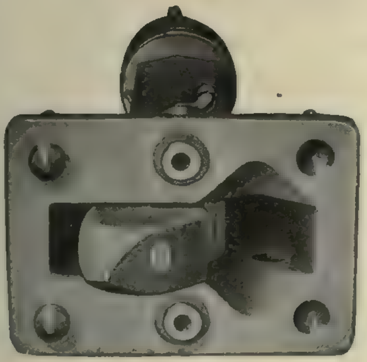
Train operation has become a necessity to handle rush hour travel. Tomlinson Automatic Couplers have become a necessity to train operation.

Cars, air lines and electric lines are connected automatically and simultaneously without sending a man between the cars.

A pull of a chain at the side of the car does the uncoupling.

Tomlinson Couplers operate as a single unit from anchorage point to anchorage point without strain on car frame, air hose or electric conduit.

Many unusual and interesting applications have been made. The interlocking possibilities for signals, braking, door operation seem unlimited. The specialized knowledge of our engineers is yours for the asking.



End-on View of Form 8 Coupler—note Air Connecting Gaskets

5 Point Electric Couplers mounted on Tomlinson Air Connecting Car Couplers.

THE OHIO BRASS COMPANY

Mansfield, Ohio

New York Philadelphia Pittsburgh Chicago
San Francisco Los Angeles Paris, France

Manufactures:—Car Equipment, Trolley Materials, Rail Bonds, Hi-Tension Insulators, Third Rail Isulators.

IT'S EXPENSIVE

❧ EXPERIMENTING is an expensive operation; a costly item from start to finish. But much valuable data is to be gained through tireless experimenting and endless investigating. Therefore, this work should not be discouraged.

❧ But so many Central Stations continue to make extensive as well as costly experiments with line equipment, especially Insulators. *Why do they do it?* It is a great expense to them and in many cases they are merely duplicating the work which others before them have completed.

❧ Permit us to again remind our friends of the Central Station that we are desirous of assisting them in conducting their investigations and experiments on Insulators. We maintain a thoroughly capable staff of Engineers for just such work, also sufficient modern laboratory equipment.

You are, therefore, invited to

Submit Your Problems to Our Engineers

EVEN THOUGH YOU ARE NOT YET USING

THOMAS QUALITY INSULATORS

The

R. THOMAS & SONS CO.

EAST LIVERPOOL, OHIO

NEW YORK ❧ BOSTON ❧ CHICAGO

LONDON

Illuminated Car Signs *and* "Golden Glow" Headlights—

"Will also advertise your service"

Aside from the usual reasons for installing Illuminated Car Signs and efficient headlights on railway cars it is well to consider the advertising value of this equipment. A well displayed destination name is an inducement to ride, and likewise the powerful but soft beams of "Golden Glow" light tends to inspire confidence in both riders and crew. This equipment not only provides wonderful advantages in operation but it will also advertise your service.

Write complete data

ELECTRIC SERVICE SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

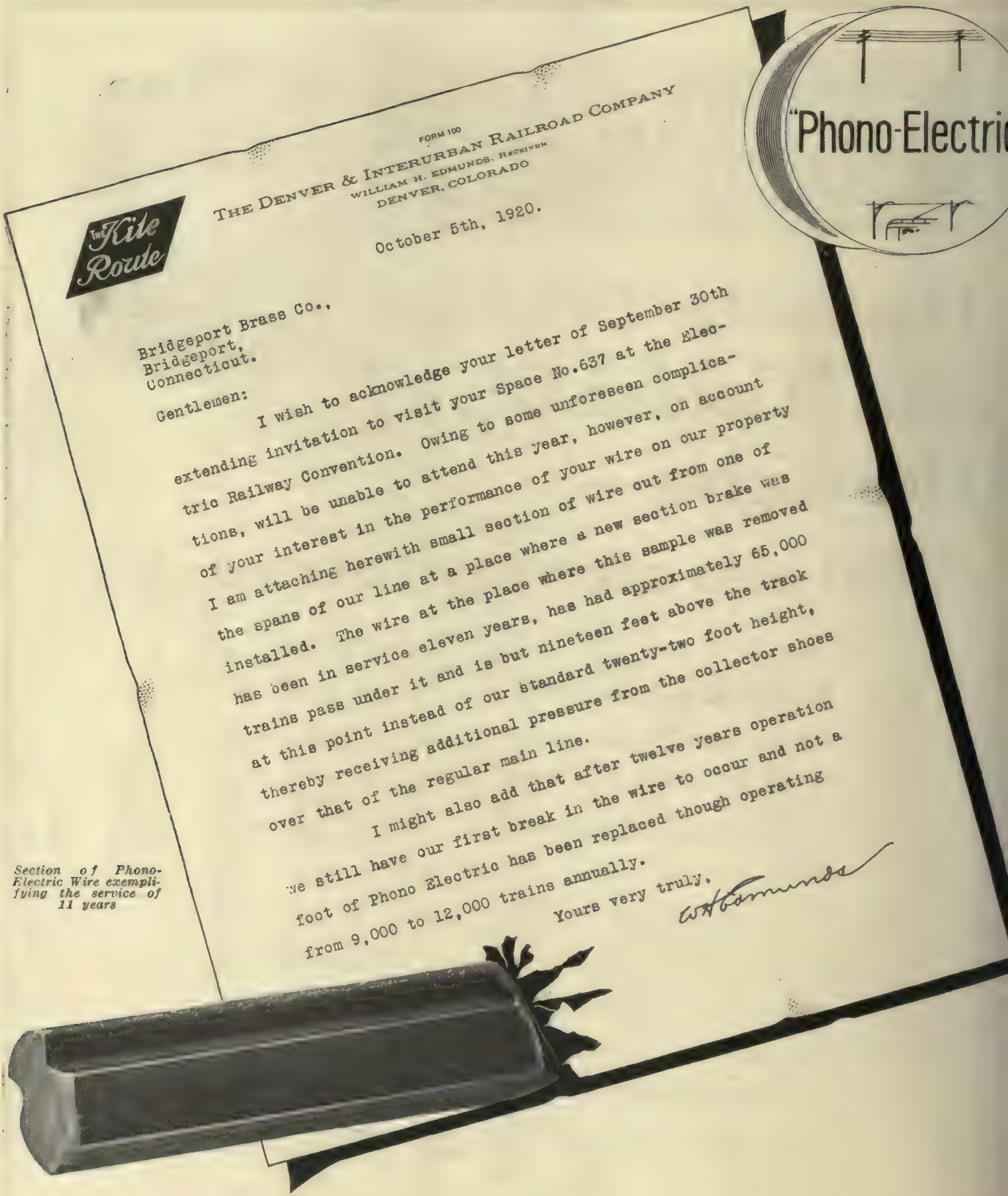
PHILADELPHIA
17th and Cambria Streets

NEW YORK
50 Church St.

CHICAGO
Monadnock Building

Branch Offices: Boston, Scranton, Pittsburgh

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto


"Phono-Electri

The Kite Route

FORM 100
THE DENVER & INTERURBAN RAILROAD COMPANY
WILLIAM H. EDMUNDS, RECEIVER
DENVER, COLORADO

October 5th, 1920.

Bridgeport Brass Co.,
Bridgeport,
Connecticut.

Gentlemen:

I wish to acknowledge your letter of September 30th extending invitation to visit your Space No.637 at the Electric Railway Convention. Owing to some unforeseen complications, will be unable to attend this year, however, on account of your interest in the performance of your wire on our property I am attaching herewith small section of wire out from one of the spans of our line at a place where a new section brake was installed. The wire at the place where this sample was removed has been in service eleven years, has had approximately 65,000 trains pass under it and is but nineteen feet above the track at this point instead of our standard twenty-two foot height, thereby receiving additional pressure from the collector shoes over that of the regular main line.

I might also add that after twelve years operation we still have our first break in the wire to occur and not a foot of Phono Electric has been replaced though operating from 9,000 to 12,000 trains annually.

Yours very truly,
WHEdmunds

Section of Phono-Electric Wire exemplifying the service of 11 years

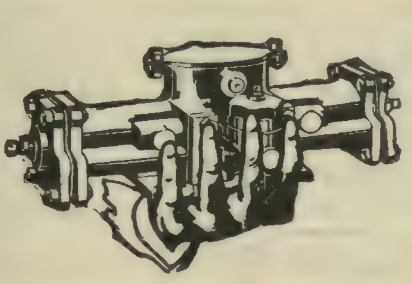
Phono-Electric Trolley Wire Gives Satisfactory Service Everywhere

Bridgeport Brass Compan

Bridgeport Connecticut

2277

Pneumatize!



Modernize!

More Doors—More Speed More Speed—More Money Miles

Have you looked over your drop-platform car lately to see if you can't alter 'em to produce as many revenue miles per hour as your later pneumatized "pay-leaves."

If not, now is the time, with money too tight and high for many new cars.

Just invite us to co-operate with you in this once-over. We have had a lot of experience in raising the rate of passenger interchange, which really means *more money miles per hour,* whether in rush hour or off-hour service.

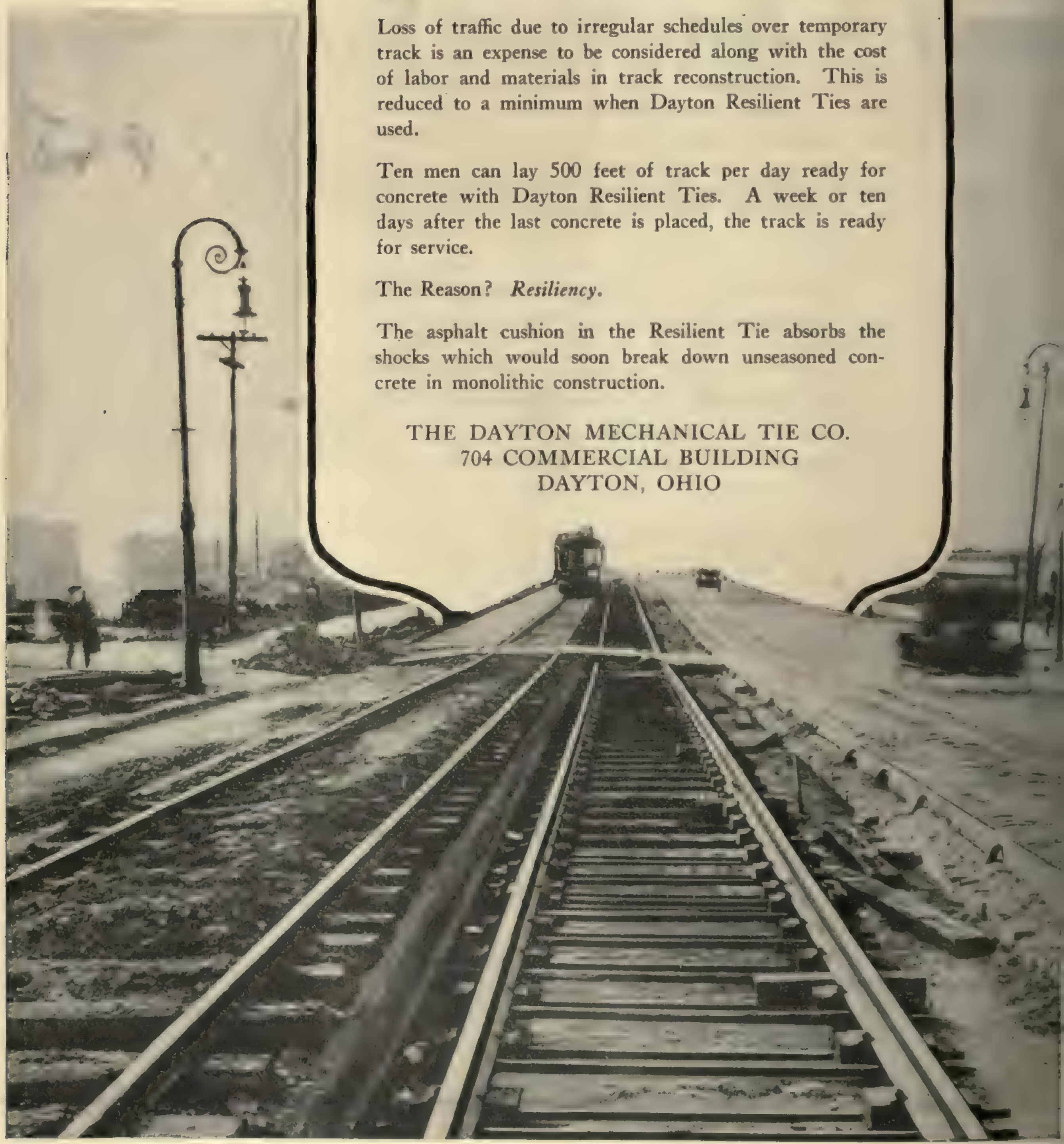
One or more of the NATIONAL PNEUMATIC CAR OR TRAIN ACCELERATORS will produce results!

National Pneumatic

Door and Step Control
Motorman's Light Signals
Door and Step Operating Mechanisms
Interlocking Safety Door Control
and
Multiple Unit Door Control

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd.
Toronto, Ont.

National Pneumatic Company, Inc.
50 Church St., New York
Edison Bldg., Chicago
Works: Rahway, N. J.



Better Track for Less Money

Loss of traffic due to irregular schedules over temporary track is an expense to be considered along with the cost of labor and materials in track reconstruction. This is reduced to a minimum when Dayton Resilient Ties are used.

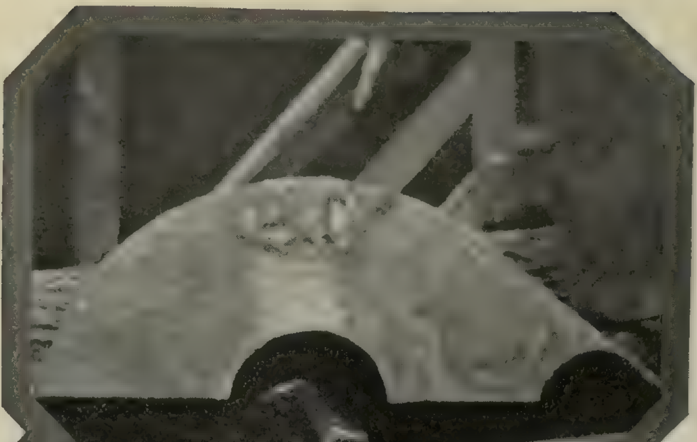
Ten men can lay 500 feet of track per day ready for concrete with Dayton Resilient Ties. A week or ten days after the last concrete is placed, the track is ready for service.

The Reason? *Resiliency.*

The asphalt cushion in the Resilient Tie absorbs the shocks which would soon break down unseasoned concrete in monolithic construction.

THE DAYTON MECHANICAL TIE CO.
704 COMMERCIAL BUILDING
DAYTON, OHIO

How an R-W-B Dynamotor renewed the life of this equipment



See that weld on the gear case? It was welded by an R-W-B Dynamotor and made as good as new. This crossover center was so worn the track gang ripped it out to scrap—but the operator of the R-W-B Dynamotor knew what that versatile machine could do and built up the worn parts to the perfect condition your see by the photograph. In the bottom photograph the operator is building up a cupped rail.

Scores of foremost electric railways use R-W-B Dynamotors for rail joint welding with the Lincoln Carbon Arc Process, track welding, welding Lincoln Bonds to rails, and shop welding.

Our engineering department will give you some very interesting data.

RAIL WELDING AND
BONDING COMPANY
Formerly The Lincoln Bonding Co.
Cleveland, Ohio

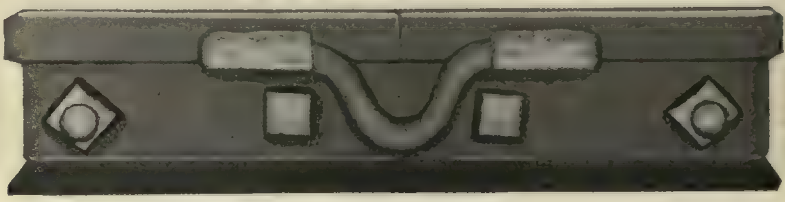
OFFICES
New York London Chicago

RWB

ERICO

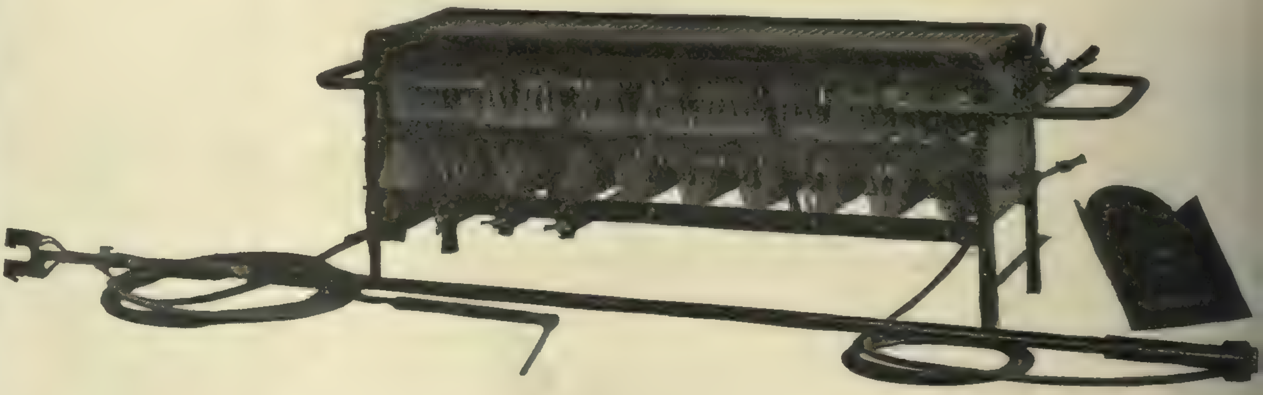
Brazed or Arc Weld Bonds

Can be furnished in a type or a form that will just suit your requirements.



Type "AA" Arc Weld

The outfit necessary for their application is the least expensive and the most convenient on the market.



Write for Samples and Complete Information.

The Electric Railway Improvement Co.
Cleveland, O.

Superior Avenue, Cleveland, Ohio

MAINTENANCE WAS BUILT INTO THIS STREET

The close of the year 1920 marked the successful completion of Superior Avenue, Cleveland, a hard traffic street, paved exclusively with Granite Block from East 12th Street to East 55th Street.

City officials, after careful consideration, selected Granite Block on account of low maintenance cost and durability.

Area covered 74,148 square yards, shipped in 407 freight cars and 143 working days.

GRANITE
EVERLASTING

THE NORTHERN GRANITE & STONE COMPANY

909| LEADER-NEWS BUILDING, CLEVELAND, OHIO

Prompt shipping facilities by rail or water

Important Decision Rendered

Railway Officials Testify in Trial Started in 1912

Verdict in favor of Complainant—

COSTS ASSESSED ON DEFENDANT

Brief in case of;
Deliquency charge

Effie Ciency, Complainant.
VS.
Will. Fulneglect
and
Antiqua. Tedmethods; Defendants.

The Complainant, states that;

She has been reduced to a state of inefficiency, being no longer able to properly care for, and protect, the Property under her charge; that as a result thereof, there is a criminal waste of large sums of Tax Payer's and Stockholder's money; that the safety and comfort of the patrons is so jeopardized that it is a menace to the Public.

The Complainant therefore;

Prays for protection and relief from the harmful and damaging influence of wilful neglect and antiquated methods, and seeks the protection and aid of Attention and Modern Methods.

History of the case;

The Trial was started in 1912 and was of Nation wide interest, witnesses, during that time, consisted of Railway Managers and Way Officials from 45 States. . . Their testimony in favor of the Claimant, showed that they, by the use of Certain Developed Appliances, had effected enormous savings, and in so far as their track was implicated, were operating with maximum Efficiency and maintenance Economy.

Verdict and Penalty

From the testimony, the Defendants were declared GUILTY of contributing to the Delinquency of Efficiency, ordered to leave and stay away from every City having Street Railway tracks, and if found on any property, said property withstands the damages and loss occasioned by their presence. . . The Defendants are now subject to arrest in any city having car service.

Legend

Straight thinking Executives. Men of Clear Vision, of executive ability, who meet all issues squarely. . . do not *Procrastinate,* nor do they tolerate UNNECESSARY LOSSES.

They don't GUESS; they CALCULATE . . for instance, in operating costs,
They first SURVEY (ascertain and record FACTS AND FIGURES)
They next ANALYZE (deduct and determine definciency CAUSES)
They then INVESTIGATE (seek correcting factors and means)
They NOW EXECUTE (apply the CURE. . . The result of their FINDINGS)

Narrative.

Street Railways (Nation Wide) throughout 45 states, have by the use of Indianapolis Apex and Simplex Welded Joint and Bonding Plates, PREVENTED and ELIMINATED Maintenance of Joints and Bonds the ONE BIGGEST item in Maintenance of track.

Low down, loose, leaky, pounding JOINTS . . . are a HANDICAP EXPENSE, that NO MANAGER, however EFFICIENT, can overcome thru Economies or Retrenchments, in all other lines he may effect.

The little booklet on Track, Construction, Re-Construction, Reclamation, tells Effie's Story—things "Every Manager Should Know." Just say "Send me a Dando Booklet."

Write the Indianapolis Switch & Frog Co., Springfield, O.
or J. J. Costello, 201 Devonshire St., Boston.

Are your track costs on a pre-war basis?

LITTLE GIANT Portable Electric Tools can help ou put them there! Here's ow they're helping this ailway:

The Little Giant Electric Track Drill at the right works 10 to 12 times faster han hand methods, and is o to 90% more economical.

The Little Giant Portable Electric Drill in the foreground drills holes in ties and paves the way for the Little Giant Spike Driver which makes the use of screw spikes economically practicable.

Another popular tool that teamworks with this trio is the Little Giant Portable Electric Grinder, in wide use for grinding rail joints. Remember, too, that Little Giant Electric Grinders are made also in Tool-Post and Precision types that can help you in the daily grind for lower shop costs.

This "family" of Little Giants belongs on *your* payroll. Ask for bulletins, or let a C-P Service Engineer from the nearest Branch combine his experience with yours in applying these labor-savers to best advantage on your property.

Chicago Pneumatic Tool Company
Chicago Pneumatic Building · 6 East 44th Street · New York

*Sales and *Service Branches all over the World*

mingham
ston
ffalo
*Chicago
*Cincinnati
*Cleveland
*Detroit
El Paso
Erie
Franklin
Houston
Joplin
*Los Angeles
*Minneapolis
*New Orleans
*New York
*Philadelphia
*Pittsburgh
Richmond
Salt Lake City
*San Francisco
*Seattle
*St Louis
Basle
*Berlin
Bombay
Brussels
Buenos Aires
Christiania
Copenhagen
*Fraserburgh
Havana
Helsingfors
Honolulu
Johannesburg
*London
Manila
Milan
Montevideo
*Montreal
Osaka
Paris
Rio de Janeiro
*Rotterdam
Santiago
Sao Paulo
Seoul
Shanghai
Tientsin
Tokyo
Toronto
Vancouver
Winnipeg

EL-39

BOYER PNEUMATIC HAMMERS -- LITTLE GIANT PNEUMATIC AND ELECTRIC TOOLS
CHICAGO PNEUMATIC AIR COMPRESSORS -- VACUUM PUMPS -- PNEUMATIC HOISTS
GIANT OIL AND GAS ENGINES ROCK DRILLS -- COAL DRILLS

CHICAGO CP PNEUMATIC

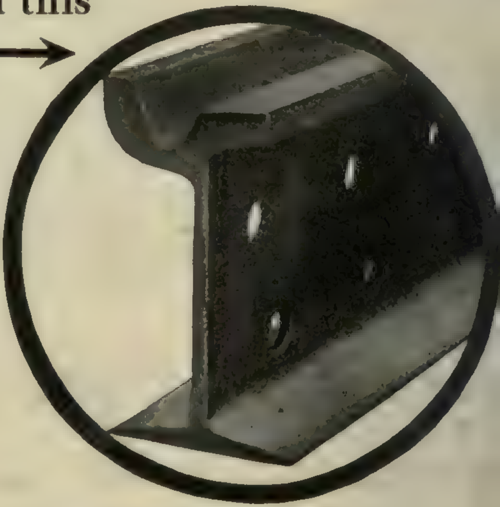
LITTLE *Electric* **GIANT** *Tools*

NELSONVILLE

Filler and Stretcher Brick

Makes It Possible for You to CHOOSE
←between this
and this→

This Weighs Less, Costs Less and Wears Longer



This Weighs More, Costs More and Wears Quicker

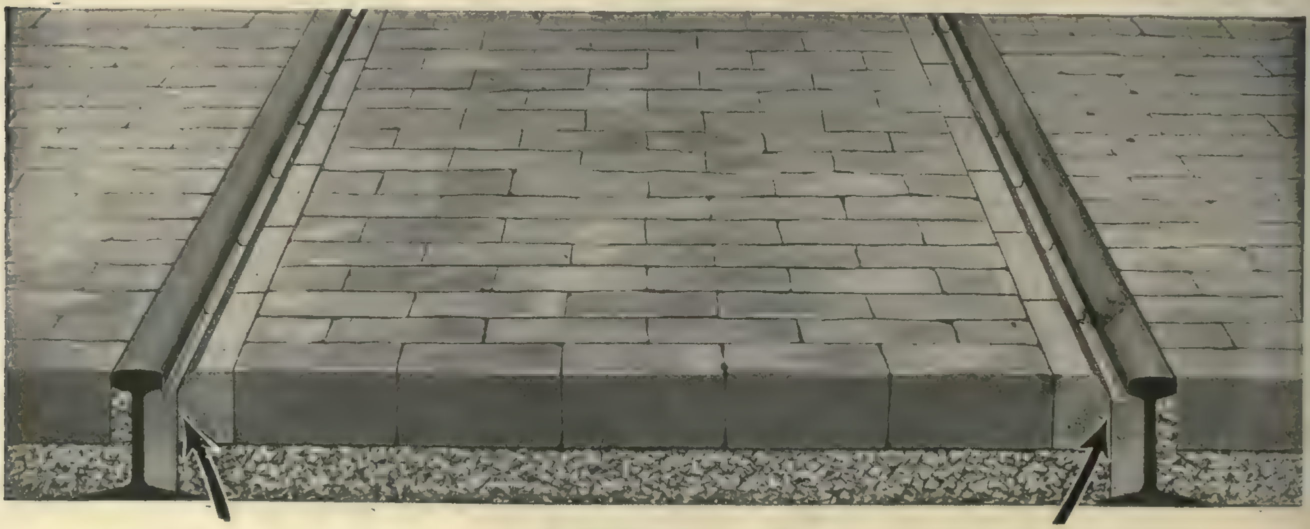
The great trouble with "T" Rails in street pavements has always been the tendency of the blocks between the rails to "kick up."

The insertion of Nelsonville Filler and Stretcher Bricks does away with "kick-up" dangers by absorbing all vibration. The ungrouted joint between the filler brick and the stretcher brick accomplishes this. This means that the old reliable, lighter and less expensive "T" rail can be used in street car track to as good advantage as the higher priced Girder rail.

Get all the facts about Nelsonville Filler and Stretcher Bricks in our booklet "Rail Brick of the Right Sort."

NELSONVILLE
Filler and Stretcher
BRICK

makes better paving, lasts longer, increases the life of car equipment by eliminating vibration and reduces track construction costs.



THE NELSONVILLE BRICK CO.

Columbus, Ohio

Western Electric National Service furnishes everything for such Transmission Lines.

To Keep Transmission Lines Operating

Turning wheels and burning lights necessitate dependable power transmission plants. The pole line materials must possess high mechanical excellence. Replacement materials must be quickly obtainable.

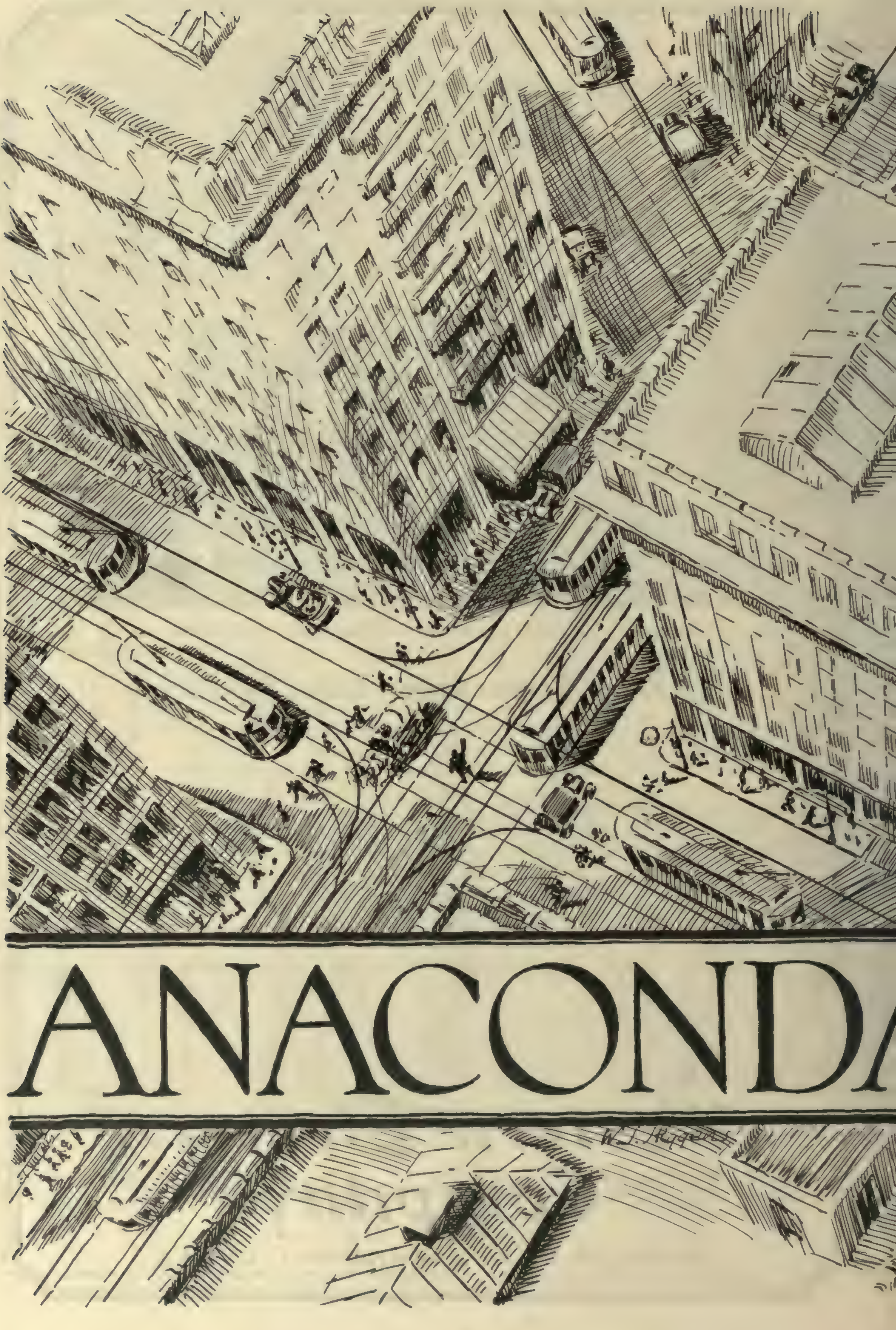
Everything for transmission lines is available at short notice through the Distributing Houses of our National Service. They have large stocks. They have specialists to help select the most suitable Poles, Crossarms, Insulators, Tools, Pole Line Hardware, Wire and other Line Construction Material for reliable power transmission.

One of these Houses is near you. They are located in 48 of the principal centers of trade.

A
National
Electrical
Service

Western Electric
Company

OFFICES IN ALL PRINCIPAL CITIES


ANACOND
W.J. Higgins

Where Traffic is heavy

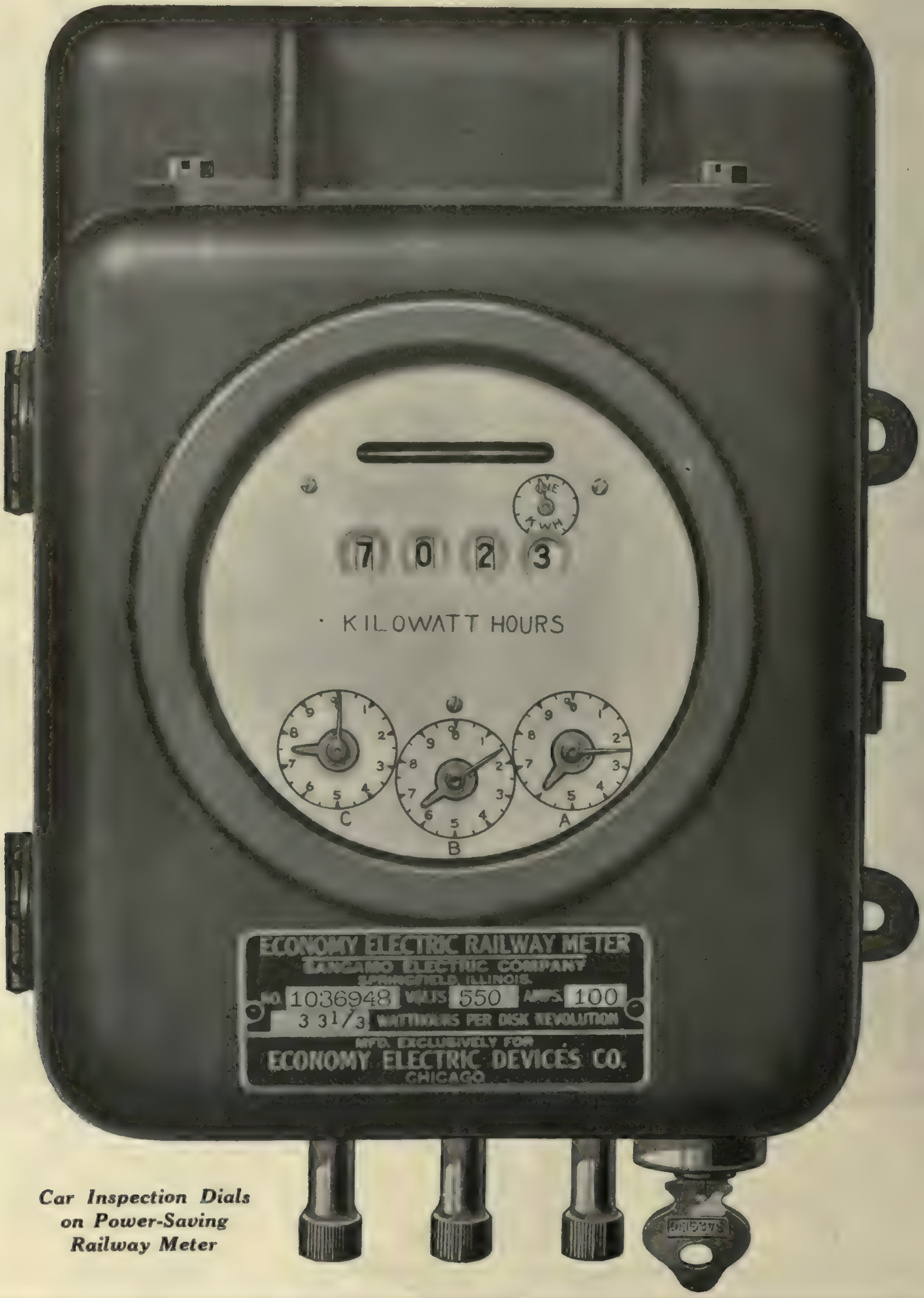
Electric Railways carry more passengers during a year than any other modern transportation agency. Our modern cities with their many suburbs would not have been possible without this improved means of transportation. Electric Railway service must be maintained without interruption.

Anaconda Trolley Wire will do its part towards eliminating the costly delays of interrupted service. Anaconda trolley wire will also reduce overhead maintenance costs through its durability, higher conductivity and reclamation value. Buy and specify Anaconda "from Ore to Finished Product."

ANACONDA COPPER MINING COMPANY
Rolling Mills Department
Mills—Great Falls, Montana
General Office: 111 *W. Washington St., Chicago*

ROLLEY WIRE

Inspect Equipmen


ONE KWH
7 0 2 3
KILOWATT HOURS
C
B
A
ECONOMY ELECTRIC RAILWAY METER
SANGAMO ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS
NO. 1036948 VOLTS 550 AMPS. 100
3 3 1/3 WATTHOURS PER DISK REVOLUTION
MFD. EXCLUSIVELY FOR
ECONOMY ELECTRIC DEVICES CO.
CHICAGO

Car Inspection Dials on Power-Saving Railway Meter

on the Kw. Hr. Basis

The Economy Power-Saving Railway Meter Provides the Safest and Most Efficient Basis for Equipment Inspection

Most parts of a car require inspection at intervals proportionate to work done Neither mileage run, elapsed time, power-on time or any other time factor correctly measures the work done by the car.

The ECONOMY "Power-saving" and Car Inspection Meter provides a method that accurately and automatically shows when inspection is needed. It also shows at a glance how much more work a car can do before inspection is needed, or, in case of a road failure, how much work it has done previous to the failure. All this is had without any clerical labor.

The result is more thorough inspection without increased labor cost, or the previous standard of inspection for less labor cost. It will save considerable money heretofore spent because of too many inspections on some cars and too few on others.

The opposite page shows an ECONOMY Power-Saving Railway Meter, with car inspection dials. The cyclometer type dials at the top are for motormen's power saving records. The lower dials are for car inspection use. The meter is unchanged from standard except for the front case and dial, which are applicable to old meters.

When the motor-driven hand on dial A reaches the marker set for this car at 6, the barnman knows that the brakes and controllers have done their work and are due for inspection equivalent to that otherwise made daily.

Likewise dial B shows when the car has done sufficient work to require oiling. This supplants the usual time or mileage period for oiling.

Dial C shows when the car has done sufficient work to require general inspection.

After any inspection the meter-driven hand is set back to zero by means of its reset rod at the bottom of the case.

A lock prevents unauthorized resetting of inspection dials.

The ECONOMY Meter with inspection dials is readily adaptable to any electric car or locomotive operating condition. It is the only power-saving device whose unit is correct for use in determining when cars should be inspected.

The ECONOMY Railway Meter saves power at the car and labor at the car house.

Ask for Rental Payment Plan and estimate of operating costs.

Recent Purchasers
of
Economy
Power Saving and
Car Inspection Meters

1. **Philadelphia Rapid Transit**
2. **Union Traction Co. of Indiana**
3. **Cincinnati Traction Co.**
4. **Illinois Traction System (Quincy)**
5. **Milwaukee Electric Railway & Light Co. (Racine)**
6. **Washington-Virginia Railway (Day & Zimmerman, Management)**
7. **Ranier Valley Lines (Seattle)**
8. **Buffalo & Lake Erie (Erie)**
9. **Union Street Railway (New Bedford)**
10. **Sacramento Northern Railway**

ECONOMY ELECTRIC DEVICES COMPANY

Old Colony Bldg., Chicago, L. E. Gould, Pres.

National Railway Appliance Co., New York **Ludwig Hommel & Co., Pittsburgh**
Burton R. Stare Co., Seattle
Grayson Railway Supply Co., St. Louis **L. A. Nott, San Francisco**
J. G. Monahan, Los Angeles

For Electric and Steam Railroa

SWITCHES — MATES

Solid Manganese Steel

Converter and Electric Steel Castings ***Hamme***

Our extensive, mode
plant, here illustrate
is equipped to fabrica
track work of all co
structions, Solid Ma
ganese Steel, Mang
nese Steel Insert, Pla
Bolted and Mangane
Steel "T" Rail, et
which, coupled wi
our long experien
places us in a p
sition to supply yo
needs efficiently. P
your track proble
up to our experts.

WHARTON SPE

WM. WHARTON, JR. & CO., INC.

EASTON, PENNA.

"Originators of Manganese Steel Track Work"

SALES OFFICES:

Boston, Mass.
Chicago, Ill.
Denver, Col.
New York City
Philadelphia, Pa.
Pittsburgh, Pa.
San Francisco, Cal.
Scranton, Pa.

n *All Types* of Construction

FROGS — CROSSINGS

Manganese Steel Insert

Press Forgings *Seamless Steel Gas Cylinders*

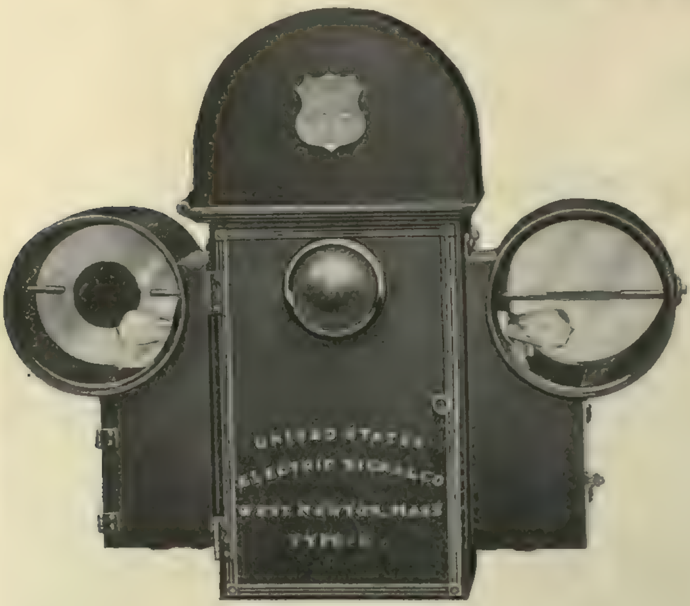
Look at this comprehensive view of our large Layout Yard, where Special Track Work is assembled and carefully fitted together, to avoid any possibility of trouble during installation. No piece of work leaves our plant without such careful fitting. You can depend on Wharton Track Work.

AL TRACK WORK

Subsidiary of Taylor-Wharton Iron & Steel Co.
High Bridge, N. J.

Other Plants:
TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.
PHILADELPHIA ROLL & MACHINE CO., Philadelphia
TIOGA STEEL & IRON CO., Philadelphia

Speed with Safety



The U. S. Automatic Trolley Contact Signal speeds up traffic with utmost safety

With all respect to the human element, we all feel a bit safer when our signal systems are automatic and safe. With U. S. Signals registering "go" or "stop" *automatically* danger is reduced to a minimum.

And to add the factor of *speed* to safety there must be no delay with throwing signals by hand, or leaving the car. The greater scheduled speed for Safety Cars may mean accidents unless your cars are protected with automatic signals that do not fail to work. Less headway means that your cars are liable to rear-end collision on sharp turns unless you can "look around the corner" with an automatic signal. Now, since all these demand an automatic signal, why not equip your route with the best?

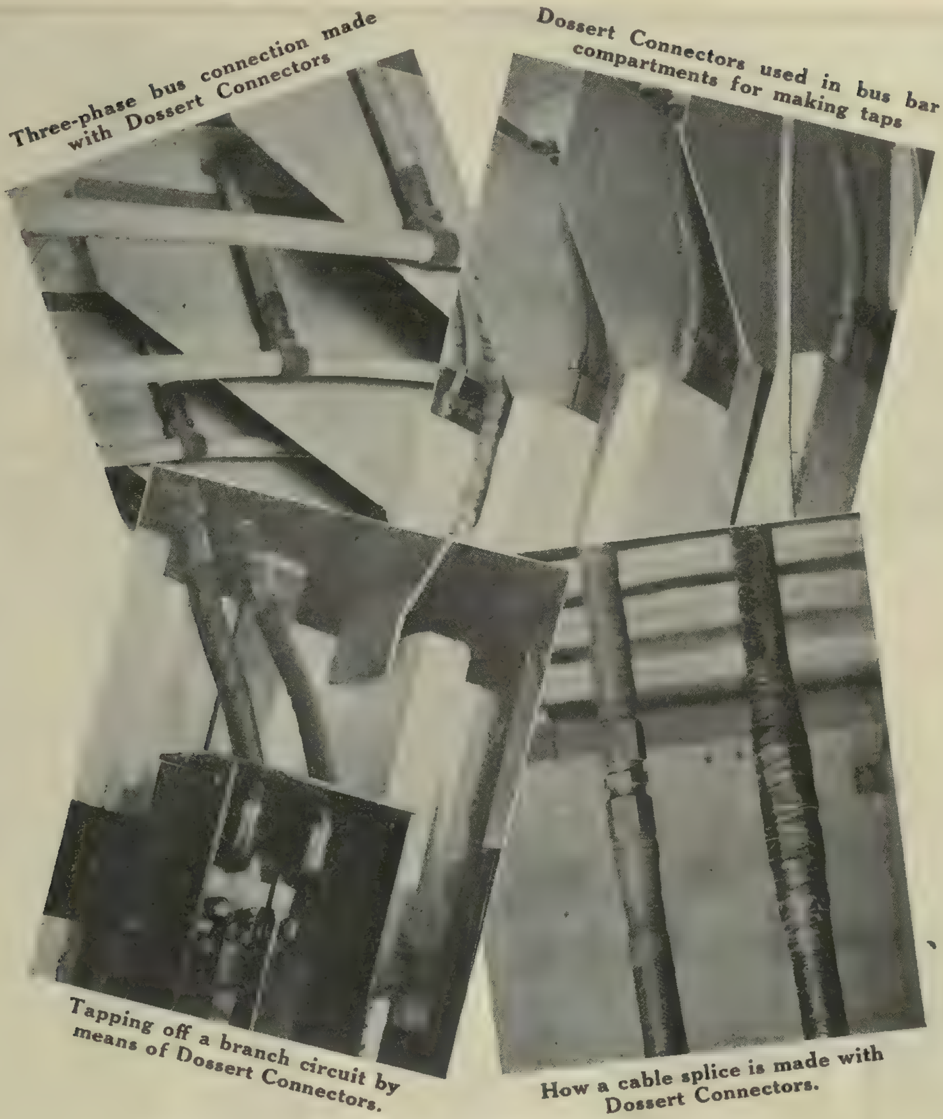
The United States Electric Signals never fail. Send for Bulletin and it will tell you why.

United States Electric Signal Company

West Newton, Massachusetts

Representatives: Western: Frank F. Bodler, Monadnock Bldg., San Francisco.
Foreign: Forrest City Electric Services Supply Co., Salford, England

DOSSERT
Solderless
Connectors



Three-phase bus connection made with Dossert Connectors

Dossert Connectors used in bus bar compartments for making taps

Tapping off a branch circuit by means of Dossert Connectors.

How a cable splice is made with Dossert Connectors.

Photographs from plant of Great Falls (Montana) Power Co.

How to Solve Your Difficult Problems in Wiring and Cable Work

Wiring and cable problems are all in the day's work, but just so surely as they crop up just so surely can they be solved at a saving in time, labor and materials of installation.

No matter what service, great or small, there is a Dossert Connector that will do the work more easily, more quickly and for less money—and will give a better connection.

Dossert Connectors assure that the connections and terminals are doing their part to maintain an unimpeded flow of current with minimum heat losses. A Dossert Connector will not heat as much as the cable which it connects when the cable is heavily overloaded.

Labor is time and time is money; Dossert Connectors save time and hence save labor. This item alone justifies their selection over any other type of connection.

Don't let this wiring question puzzle you. The answer to it is clear.

Write for Catalog No. 15.

DOSSERT & COMPANY

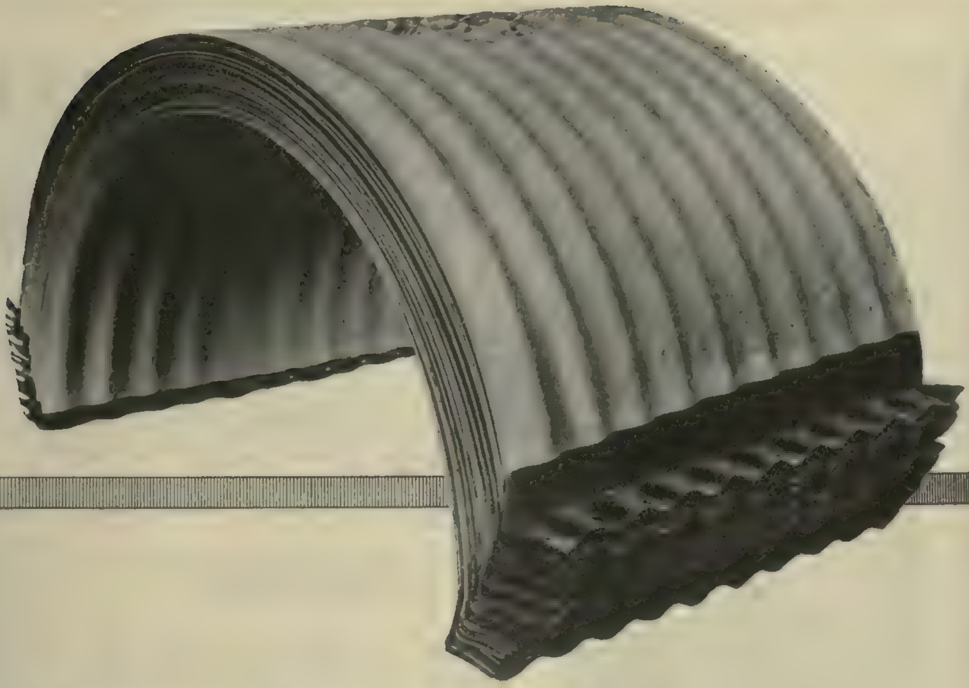
H. B. LOGAN, President, 242 West 41st Street, New York

WASHINGTON, BALTIMORE & ANNAPOLIS RAILROAD

OKONITE Wire Installed 1917 Washington to Baltimore

OKONITE

THE OKONITE COMPANY, Passaic, N. J.
INCORPORATED 1884
Central Electric Company, Chicago, Ill., General Western Agents
F. D. Lawrence Electric Co., Cincinnati, O.
Novelty Electric Co., Philadelphia, Pa.
Pettingell-Andrews Co., Boston, Mass.



Handle large diameters a section at a time!

Picture this! You have bought some 48-inch riveted corrugated culverts. At the freight station your men heave and sweat trying to load them onto long coupled wagons. Your neighbor also bought some 48-inch corrugated culverts.

But they were

"ACME" (NESTABLE)

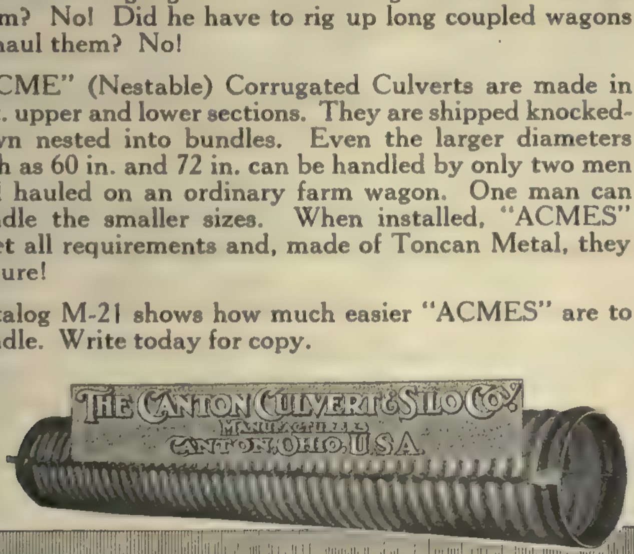
TONCAN METAL

CORRUGATED CULVERTS

Did he send a gang of men to the freight station to handle them? No! Did he have to rig up long coupled wagons to haul them? No!

"ACME" (Nestable) Corrugated Culverts are made in 2-ft. upper and lower sections. They are shipped knocked-down nested into bundles. Even the larger diameters such as 60 in. and 72 in. can be handled by only two men and hauled on an ordinary farm wagon. One man can handle the smaller sizes. When installed, "ACMES" meet all requirements and, made of Toncan Metal, they endure!

Catalog M-21 shows how much easier "ACMES" are to handle. Write today for copy.



BOND TESTING TIME

WILL SOON BE HERE

ARE YOU READY?

If you have a ROLLER-SMITH Bond Tester you are. If you haven't, it will pay you to

READ THIS MESSAGE

Front View of Instrument

The

ROLLER SMITH Bond Tester

IS THE STANDARD OF THE WORLD

A List of the Countries in which the ROLLER-SMITH Bond Tester is used would read like the index page of an Atlas of the World.

Bond Tester in Use, and Scale

THE REASON IS THAT IT MEETS ALL THE REQUIREMENTS OF A SATISFACTORY BOND TESTING DEVICE

Bar in place on "T" Rail Showing Saw Blade Contact

It is small, compact, and light in weight.
It is conveniently arranged for portable use.
It reads direct in units of feet of rail.
It is accurate, but rugged and reliable.
It needs only one man to operate it.
Its bar contacts "bite" right into the rail head.
It is actuated by the current normally flowing in the rail.
It is a thoroughly high-class piece of apparatus made by a thoroughly responsible concern.
AND, ABOVE ALL, IT IS DEPENDABLE.

Bar in Place on "Girder" Rail Showing Saw Blade Contact

Bulletin No. 201 describes a light, compact Portable Storage Battery Outfit for use where the current in the rail is small, intermittent, or entirely absent, and an external source of current is required.

If you will tear off and send us this coupon we will send you Bulletins Nos. G200 and G201, which give full data.

Please send Bulletins Nos. G200 and G201.

Name ....

Company ....

Address ....

City and State ....

ERJ3-1921

ROLLER-SMITH COMPANY
Electrical Instruments, Meters and Circuit Breakers

2128 Woolworth Bldg.,
NEW YORK

Works
BETHLEHEM, PA.

CHICAGO
Monadnock Block

CLEVELAND
7016 Euclid Ave.

DETROIT
Majestic Bldg.

BALTIMORE, 113 E. Franklin St.
BIRMINGHAM, Brown-Mark Bldg.
BOSTON, 141 Milk St.
BUFFALO, 707 Ellicott Sq.
DALLAS, 2002 Live Oak St.
DENVER, U S Nat'l Bank Bldg.
LOS ANGELES, Title Insurance Bldg.
MINNEAPOLIS, 414 South 6th St.
MEMPHIS, 493 South Main St.
MONTREAL, Power Bldg.
PHILADELPHIA, Drexel Bldg.
PITTSBURGH, Union Arcade Bldg.
ST. LOUIS, Railway Exchange Bldg
ST. PAUL, Pioneer Bldg.
SALT LAKE CITY, 59 West B'way
SAN FRANCISCO, 589 Howard St.
SEATTLE, 524 First Ave., South
TORONTO, 183 George St.

After 12 Years In Railway Service These Armco Culverts When Last Inspected Were

IN PERFECT CONDITION

Because they are economically transported, are easily and quickly installed, and make permanent improvements, railroads are using Armco Culverts in greater numbers each succeeding year.

Up to 5,000 feet of Armco Culverts, in diameters of 30 inches and less, may be loaded on a flat car and the total weight will be well within the capacity of the car. Hence transportation charges per unit section are extremely low when Armco Culverts are used.

The actual work of installation in the majority of cases is quickly and easily done by common labor—the usual method being to dig a trench and roll the culvert in. Concrete and rubble head walls—although not absolutely necessary, because of the rodded end construction of Armco Culverts—add to the appearance of the job and give extra protection to the culvert ends.

But in addition to these favorable points the *permanence* of Armco Culverts makes them preferred by railroad engineers. Once installed they are there to stay, for the chemical purity, homogenous texture and heavy galvanizing of Armco Ingot Iron from which Armco Culverts are made insures rust resistance and long service.

ARMCO
Resists Rust
Ingot Iron

There is a manufacturer in nearly every state, and in Canada, making genuine rust-resisting ARMCO CULVERTS and other products of Armco Ingot Iron such as flumes, siphons, tanks, road signs, roofing, etc. Write for full information and nearest shipping point on products in which you are interested.

ARMCO CULVERT & FLUME MFRS. ASSN.
215 NORTH MICHIGAN AVE. CHICAGO

Adjusting Insert Between Rail Heads

Making the Weld by Pouring Thermit Steel Into the Mold

Why Is It that During a Period of Over Eight Years the Number of THERMIT INSERT WELDS that Break are Practically Negligible?

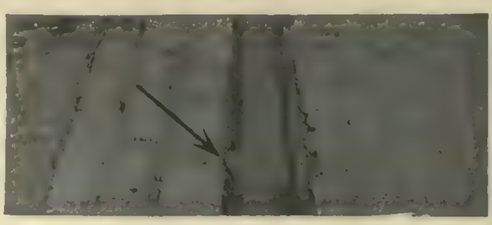
Because in Thermit welding the heat applied is distributed over a wider area instead of being concentrated along certain lines or at certain spots. Thus the stresses due to resulting temperatures do not destroy the rail fiber.

The wave motion due to the rolling of the wheels is an endless wave until it hits special work or mechanical joints. This wave motion can only be obtained and transferred from rail to rail by absolutely eliminating the joint or by butting the heads together under so much additional compression that no changes in temperature will tend to separate them. This latter is, of course, impossible with any mechanical joint.

We feel that the last eight years have demonstrated conclusively that the Thermit Insert rail weld is the solution of the rail joint problem. Furthermore, it gives simple yet speedy application and the companies themselves can do their own welding at their own convenience and at a speed which will keep pace with other track work.

It absolutely does away with maintenance expense throughout the life of the rail and by the elimination of joints and a great deal of corrugation makes the rail last much longer than otherwise.

Now that spring track construction is near at hand, let us send you an experienced engineer to instruct your men how to eliminate track joints and joint troubles by means of Thermit Welding.



Completed Thermit Insert Weld Installed in the Street

Send for Pamphlet 3932.

METAL & THERMIT CORPORATION

Boston
Pittsburgh
Chicago

120 Broadway New York

Toronto
San Francisco

PACKARD

Busses Aid Rail Lines

Packard Trucks equipped with passenger carrying bodies offer to electric street railways a means to increase both their earnings and the good will of their public.

Packard Trucks fitted with omnibus bodies can be used to supplement regular car service in rush hours; they can be used to continue service when an accident occurs to car or track, or to extend service beyond car line ends.

The dependability and the economy of Packard Trucks are direct results of the tested design, the selected materials and expert workmanship that enter into all Packard manufacture, and of the method by which every Packard Truck is rated to its particular job.

In Newark, the New Jersey Auto Bus Association purchased a fleet of Packard Trucks, fitted them with bodies carrying fifty passengers, and now at speeds up to 28 miles an hour serve the public with safety, dispatch and comfort.

Every Packard Truck has the benefit of the countrywide service facilities established to keep the Packard Truck at the highest possible level of efficiency.

PACKARD MOTOR TRUCK COMPANY · DETROIT

Ask the man who owns one

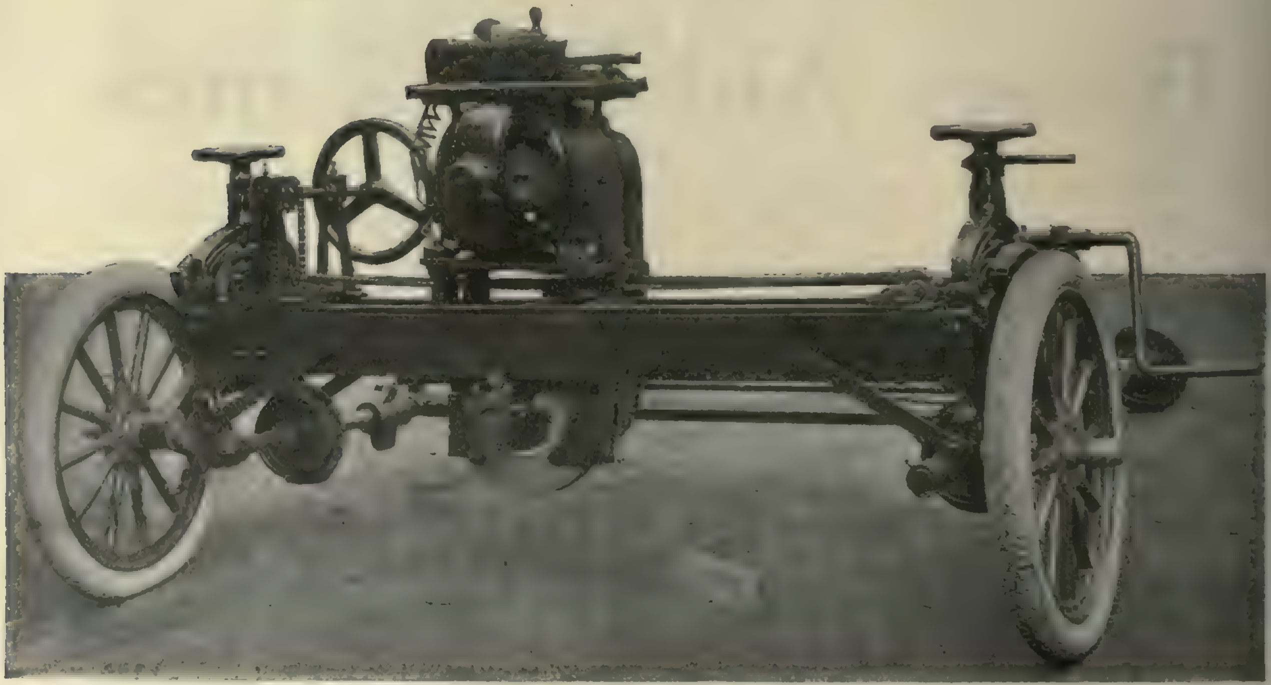
Seven Features of

UNIVERSAL

ROTARY TRACK GRINDERS

1. Large Pneumatic Derail Wheels
2. Outboard Bearing on the Grinding Wheel Arbor
3. A Grinding Wheel that may be tilted to meet any angle of the rail head
4. Adjustable Outrigger
5. Easy adjustment of all parts
6. Easy operation
7. Low working economy

We also make the "Atlas Rail Grinder" and "Reciprocating Track Grinder"



RAILWAY TRACK-WORK CO.

3132-48 East Thompson St., Philadelphia, Pa.

Exclusive Agents:

ATLAS RAILWAY SUPPLY CO.
Chicago, Ill.

ELECTRICAL ENGINEERING & MANUFACTURING CO.
Pittsburgh, Pa.

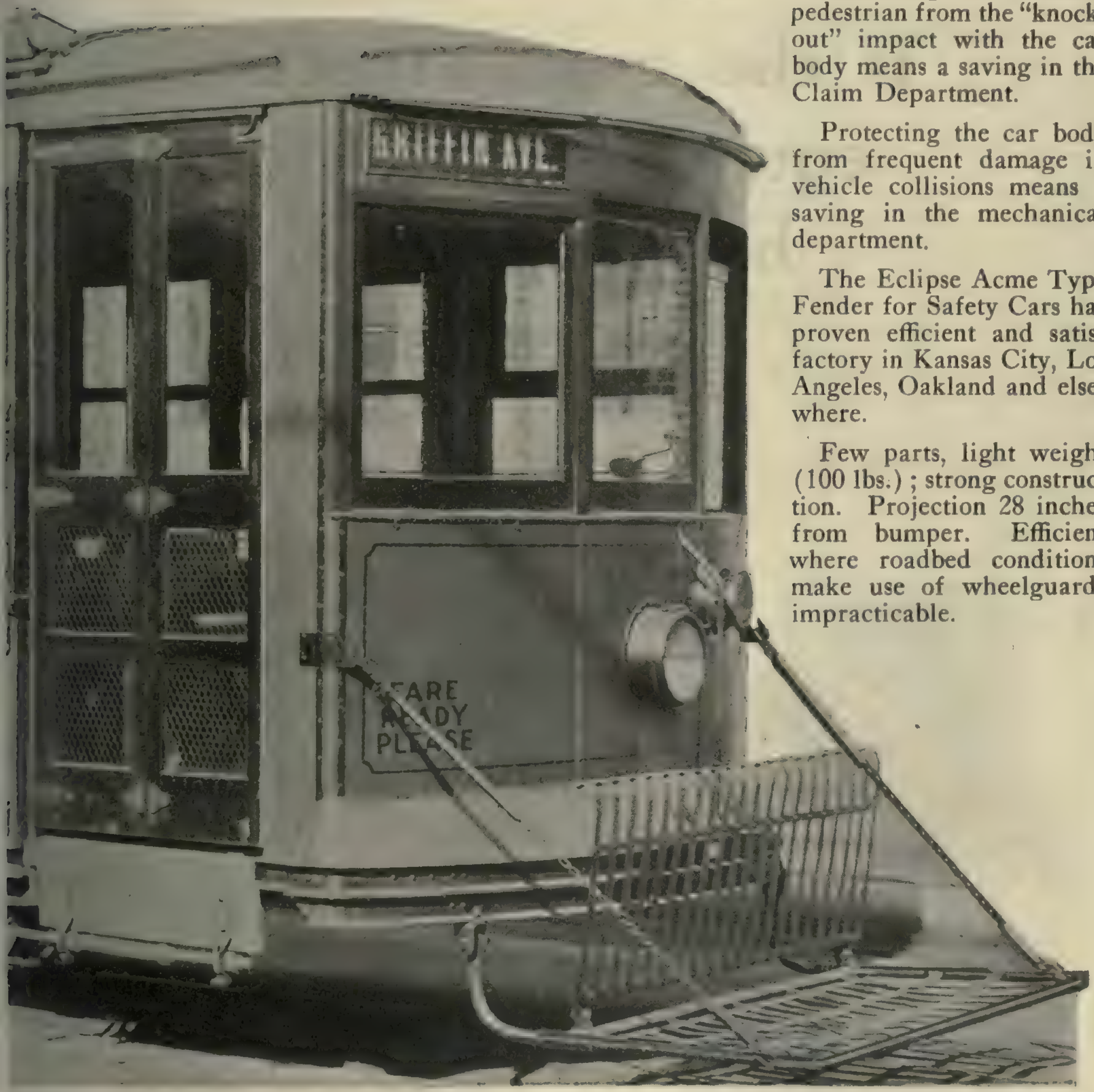
CHAS. N. WOOD CO.
Boston, Mass.

Exclusive Agents:

HITCHCOCK, LLOYD & CO., Inc
77A Queen Victoria St., E. C.
London, England

Eclipse Acme Type Fender

For Safety Cars



Protecting the unwary pedestrian from the "knock-out" impact with the car body means a saving in the Claim Department.

Protecting the car body from frequent damage in vehicle collisions means a saving in the mechanical department.

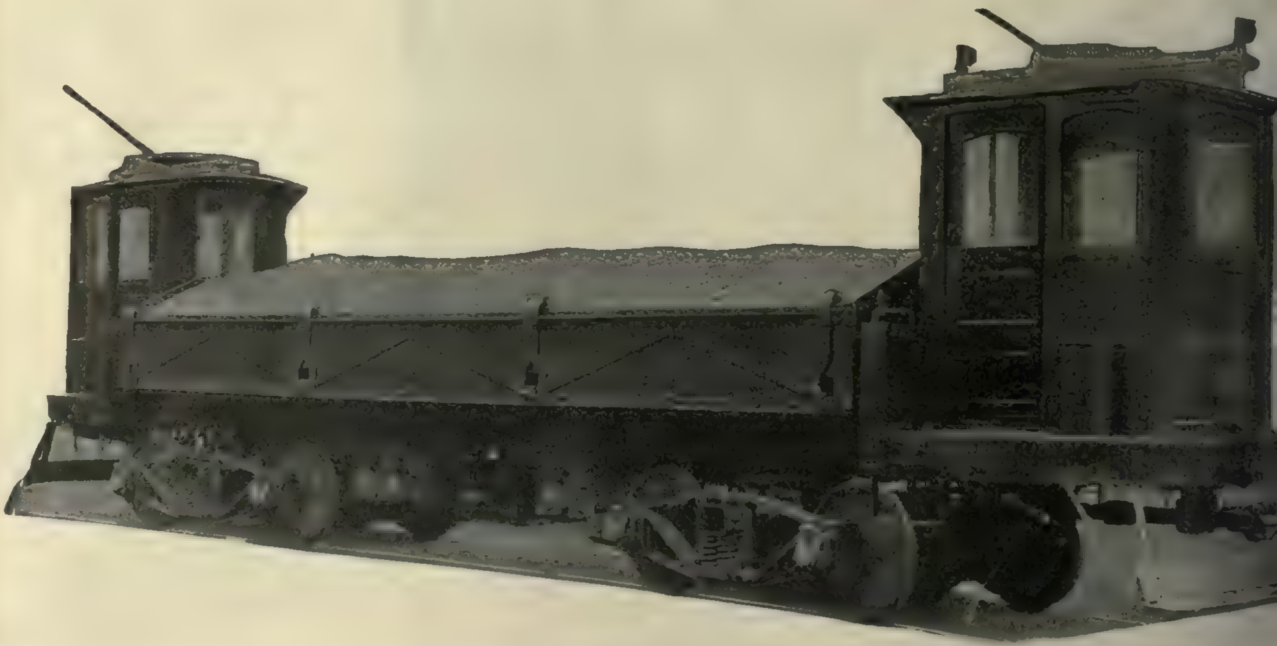
The Eclipse Acme Type Fender for Safety Cars has proven efficient and satisfactory in Kansas City, Los Angeles, Oakland and elsewhere.

Few parts, light weight (100 lbs.); strong construction. Projection 28 inches from bumper. Efficient where roadbed conditions make use of wheelguards impracticable.

THE ECLIPSE RAILWAY SUPPLY COMPANY
4824 Payne Ave., Cleveland, Ohio

THIS

is the most effective
equipment made for
handling track
materials.



New Differential concreting equipment for least cost
per yard of concrete in place. Write for details.

THE DIFFERENTIAL STEEL CAR COMPANY
H. FORT FLOWERS, *Pres. & Gen. Mgr.*
FINDLAY, OHIO

Differential

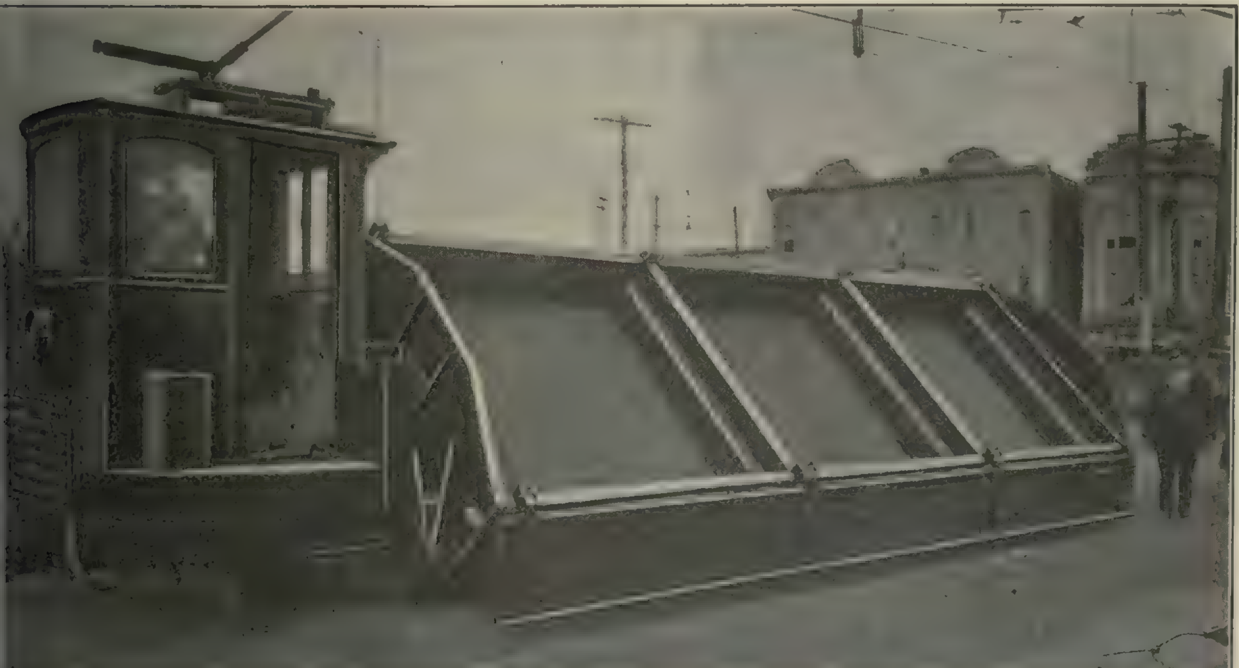
Cars will, by reason of the savings effected by their use, speedily pay for themselves

Here are a few of the reasons why:

1. They eliminate all unloading costs.
2. They decrease loading costs.
3. By virtue of the versatility of the equipment, they can be kept working while other equipment would be idle.

Their users will tell you why they are so popular

Money (Saved) Talks



THE DIFFERENTIAL STEEL CAR COMPANY

H. FORT FLOWERS, *Pres. & Gen. Mgr.*

FINDLAY, OHIO

ACKLEY BRAKES
Found The World Over

Ackley Brakes—Ligh

The All-Steel No-Staff
Is Supreme

Gear ratios { 14 x 34
12 x 36
10 x 38

The higher speeds and shorter headway now in order demand as never before the best in hand brakes. This means Ackley Brakes.

All of our brakes are equipped with a quick take-up and check chain system for slack adjustment. A twirl of the wheel or handle and the brake shoe is in contact.

For Either Heavy or Safety Cars

Send for Bulletin D

REPRESENTATIVES:
E. A. Thornwell, Atlanta Trust Company Bldg., Atlanta, Ga.
Walter H. Evans, McCormick Building, Chicago, Ill.

ACKLEY NO-STAFF TRADE BRAKE MARK

ACKLEY BRAKE & SUPPLY CORPORATION
G. S. ACKLEY & COMPANY. REPRESENTATIVES
50 Church Street, New York, U.S.A.
Agencies throughout the World
Cable address "Acklebrake"

ACKLE
BRAKE

ACKLEY BRAKES
Found The World Over

Strong and Efficient

The 2-E Staff Brake Is Unsurpassed

Gear ratios
14 x 34
12 x 36
10 x 38

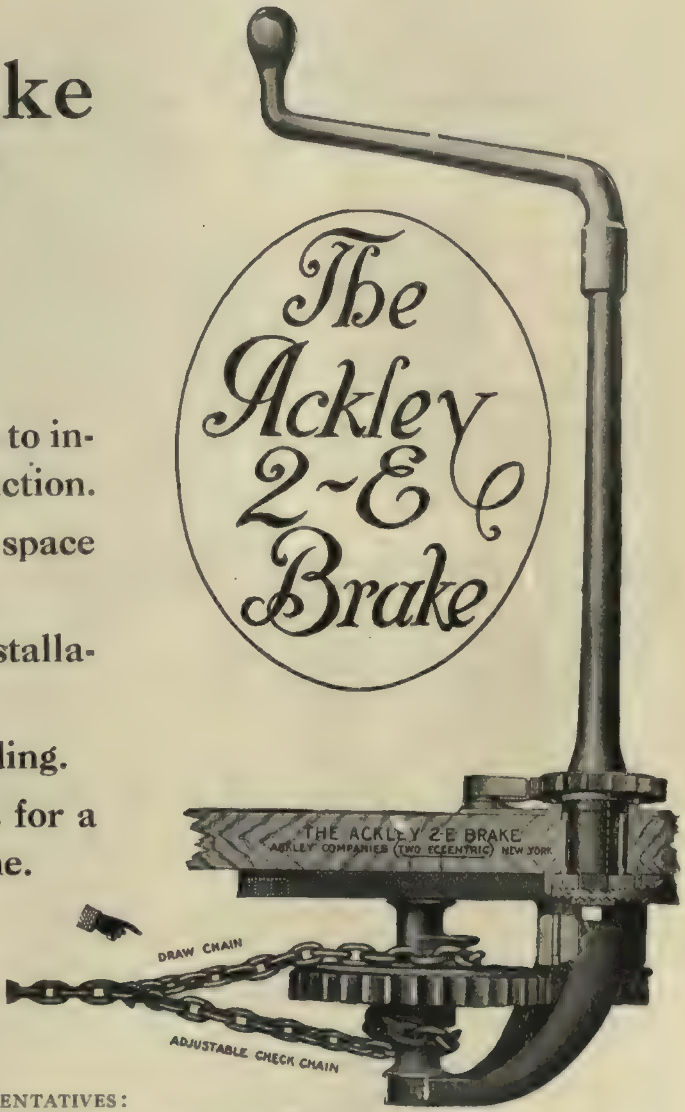
All Ackley brakes have roller bearings to insure against loss of power through friction.

Their compactness means economy in space requirement.

Their design results in low cost of installation.

Their compactness prevents chain binding.

For example, note how impossible it is for a sagging draw chain to catch in the frame.



For All Types of Cars

Send for Bulletin E

Representatives:
A. W. Arlin, Pacific Electric Building, Los Angeles, Calif.
Power Equipment Company, Oliver Bldg., Pittsburgh, Pa.

ACKLEY NO-STAFF TRADE MARK BRAKE

ACKLEY BRAKE & SUPPLY CORPORATION
G.S. ACKLEY & COMPANY REPRESENTATIVES
50 Church Street, New York, U.S.A.
Agencies throughout the World
Cable address "Acklebrake"

ACKLEY 2-E BRAKE

Don't Blindfold Your Motorman

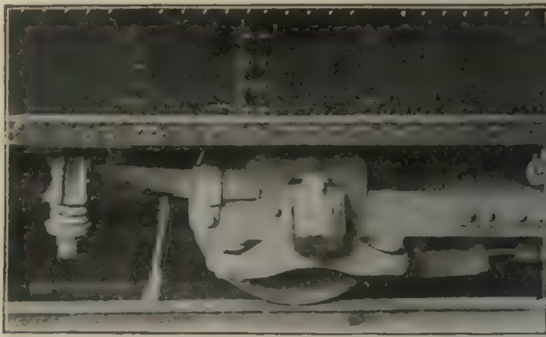
Don't Blindfold the Motormen on your Safeties against what is happening or is liable to happen to the car ahead. It's the lack of just this knowledge that is responsible for costly rear-end accidents.

Give them Nichols-Lintern Indicating Signals which insure safety by showing the motormen as well as the driving public, the exact operation of the car ahead. The first cost will be offset by an immediate reduction of claims.

In addition to eliminating rear end collisions, Nichols-Lintern Indicating Signals save power by inducing coasting, reduce the number of brake movements, and cause less wear and tear on motors, brakes and trucks.

On one road operating 1400 cars of which 700 were N-L equipped, only one rear end collision out of 82 that occurred during a test period was on a car equipped with Nichols-Lintern Indicating Signals.

Mechanical Sanders Are Life Savers When Air Is Lost



As an emergency device, the N-L Mechanical Sander with hand brake is a real life saver because it is the only combination that can prevent cars from running away when the air is lost.

As an economical device in regular service, N-L Mechanical Sanders prevent the motormen from misapplying their control apparatus, starting the emergency flow of sand and flooding the track with it.

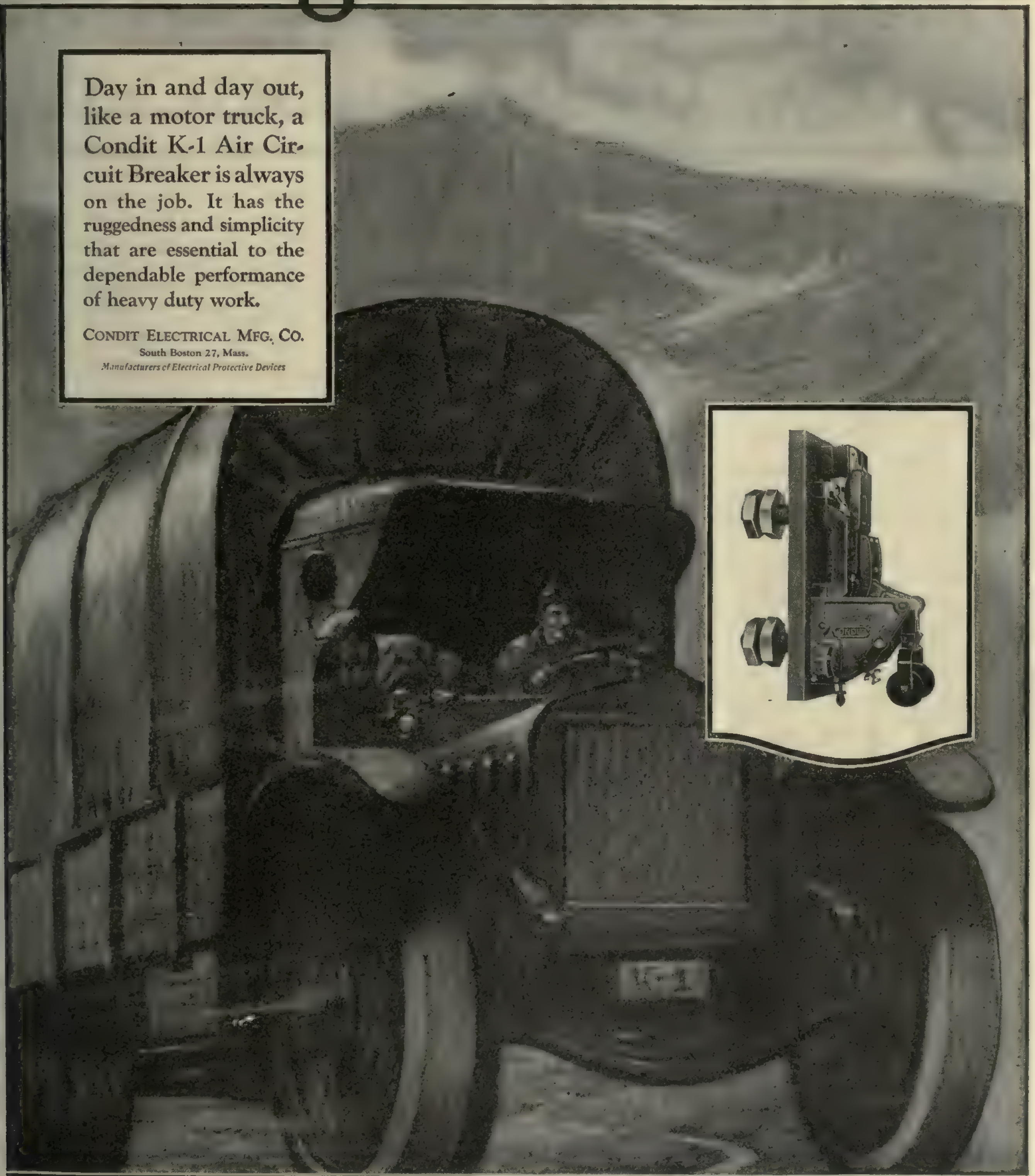
N-L Mechanical Sanders will apply all the sand you need and no more and your cars will not come back empty to need complete refilling every night.

Ask us to explain in detail.

The Nichols-Lintern Co.

8404 Lorain Avenue **Cleveland, Ohio**

Through Thick and Thin



Day in and day out, like a motor truck, a Condit K-1 Air Circuit Breaker is always on the job. It has the ruggedness and simplicity that are essential to the dependable performance of heavy duty work.

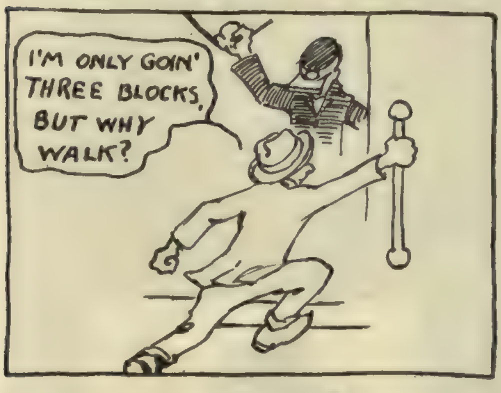
CONDIT ELECTRICAL MFG. CO.
South Boston 27, Mass.
Manufacturers of Electrical Protective Devices

Specifications: 1, 2, 3 or 4 Pole; Rear Connected, Manually or Elecrically operated; 100 to 8,000 Amperes; 650 Volts D. C.; Supplied with all usual accessories.

122-11

CONDIT

Johnson Fare Boxe
3% to 10% becau


I'M ONLY GOIN' THREE BLOCKS, BUT WHY WALK?

—*they bring back the short ride customer*

Here is a man who has to go down the street three or four blocks to keep a appointment. When fares were a nickel this man invariably waited for street car. But now, when fares are higher and he has to handle odd coins he sometimes walks. Somehow those odd pennies bother him—they seem lik quite a bit of extra money to pay for a three or four block ride.

And yet it's these short rides that help pay dividends. It's the short ride customer who so often bridges the gap between profit and loss.

If higher fares on your property have driven away the short ride custome —bring him back.

On more than 200 Electric Railways, Johnson Fare Boxes and Johnson Meta Tickets are accomplishing this very thing—and it's easy to understand why A man with a pocketful of Metal Tickets *forgets* about the odd fare an the higher rate. To him a ride means only one less ticket—and he rides whether the distance be 3 miles or 3 blocks.

JUST A MINUTE, BROTHER! AINT YOU FORGOT SOMETHING?

—*they help "get" the chronic fare dodger*

There are a lot of people—(good, churchgoing people who would fall ove in a faint if they were accused of stealing)—who seem to think that it' all OK to dodge paying their carfare every time they get a chance.

You can't change human nature and the job of moral uplift amongst th people who ride on your cars is up to the professional reformers, so you' got to get at these "fare dodgers" some other way.

Johnson Fare Boxes will make them see the error of their ways and convinc them positively that it's their cue to deposit the required number of coin every time they ride on your property.

BUSINESS MUST BE PICKIN' UP. I'M COLLECTING MORE ON THIS RUN THAN I USED TO

—*they insure maximum fare collection*

Don't be misled into the belief that "business is good" just because the pas senger traffic on your property is heavy.

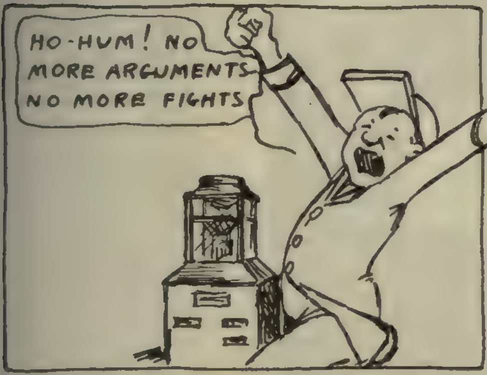
In itself that means little. It's not the number of passengers carried bu the number of *fares collected and turned over to the treasurer* that determine gross revenue and profits.

In other words, lost fares are a liability; or, look at it this way. "Th recovery of one 7 cent fare, heretofore missed, means a *net profit* of 7 cent free from all operating charges."

The function of Johnson Fare Boxes is to insure maximum fare collection that they accomplish this result is evidenced by the fact that hundreds o progressive electric railways in the country are adding 3 to 10% to thei receipts through their use, at the same time speeding up schedules and im proving service.

JOHNSON FAR

ncrease Gross Revenue ney do these things—


HO-HUM! NO MORE ARGUMENTS NO MORE FIGHTS

—*they make your conductors' jobs easier*

One reason why the Johnson Fare Box is so remarkably efficient—one reason why it cuts out lost motion, saves your conductors' time and decreases stop durations—is because it receives, counts and registers every fare through one hopper.

The Johnson Fare Box handles all classes of fares: nickels—pennies—dimes—metal tickets.

Errors—misunderstandings—arguments are cut to the minimum. Time required for fare collection is shortened at every stop. Schedules are speeded up.

The logical result is better service—a better satisfied public—and a *better satisfied management.* Johnson Fare Boxes not only improve service and increase patronage, but they also safeguard every fare deposited—a combination that results in a 3 to 10% increase in revenue.

SOME LITTLE ASSISTANT! WORKS FOR $1.50 A YEAR-3 CENTS A WEEK

—*they work for* $1.50 *a year*

Look at Johnson Fare Boxes as supplementary platform help—as assistants to your conductors. Here is part of the work they perform: They help your conductors keep an accurate check on all fares and reduce free rides to a minimum. They enable him to speed up schedules by decreasing the duration of stops—a feature which results in better service. They give him more time to look after the comfort and safety of passengers, thereby fostering public good will. Their all 'round efficiency actually increases gross revenue 3 to 10%.

A mighty efficient helper that will accomplish these things day in, day out, year in, year out, with never a day off and never a complaint about working conditions or wages. And yet the salary of this "helper" is but $1.50 a year. That's the average yearly maintenance cost of one Johnson Fare Box.

I DON'T LIKE TO BRAG, BUT I'M SO GOOD I PAY FOR MYSELF
Free

—*they pay for themselves*

The Johnson Fare Box is a money and labor saver that actually pays for itself in the first two or three months of operation. After that the extra revenue that it produces is sheer "velvet."

As a matter of fact, you don't really pay for Johnson Fare Boxes at all. You merely advance the purchase price against the cash returns which begin the hour you place the boxes in operation.

But the foregoing are only a few of the reasons why Johnson Fare Boxes will increase *your* gross revenue 3 to 10%. Our Engineering Department will gladly supply you with a dozen additional reasons—backed up by proof. *Write today* for all the facts.

Johnson Fare Box Company
Ravenswood, Chicago, Ill.

BOXES *and* METAL TICKETS

Repairing a street car wit HASKELIT

1. Ceilings
2. Headlining
3. Outside panels
4. Bulkheads

Test HASKELITE

at our expens

If you have never used Haskelite—if you are unfamiliar with t qualities of this remarkable product—if you have never investigat its waterproof, splitproof, stronger-than-steel characteristics, here an opportunity to do so—entirely at our expense.

Haskelite is the ideal material for street car ceilings—headlinings outside panels—bulkheads—side linings—backs and bottoms of sea —and for general repair work. It is an improvement over wood b cause it does not shrink or split. On account of its high water resis ance, Haskelite may be boiled and bent to any desired shape. Whe dried it retains its form permanently.

Write today for free sample

But test Haskelite yourself. Soak it and boil it and bend it pound it—hammer it—drive nails through it—and learn how stron it really is. A generous sample for this test is waiting for you. Wri for it today.

The Haskelite Mfg. Corp.
133 W. Washington St.
Chicago, Illinois

Correct lubrication means maximum service from rolling stock

"Overall Specialists"

The service men who work with you on your lubricating problems are not "experts on theories." They put on overalls and get right down to brass tacks—pack your cars—*show* you how and why Tulc should be used. They get results—real money-saving results—99 times out of a hundred. The hundredth time there is no charge for the service.

CORRECT lubrication is economical lubrication. And by economical lubrication is not necessarily meant the saving of a few cents a pound in the purchase price of the lubricant, but the results attained by its use.

This is especially true in the Electric Railway field. If the lubricant used enables your rolling stock to develop year in and year out, the highest degree of efficiency with the least expenditure of power, then economical lubrication is an accomplished fact.

Electric Railways using Tulc report a marked increase in the service life of equipment—a minimum of repair expense—a saving in labor costs—reduced overhead. These economies result in an actual dollars and cents savings, often as high as 40% over other methods of lubrication.

If you are interested in better lubrication from the standpoint of time, money and labor saving, it will pay you to learn more about Tulc and the Universal Lubricating Service that is back of every Tulc sale. No obligation—write today.

The Universal Lubricating Co.
***Offices:* Schofield Bldg.**
***Works:* Sweeney Ave.**
Cleveland, Ohio

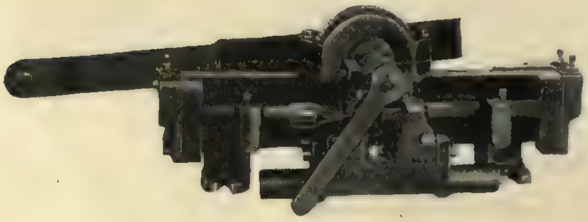
TULC
A
LUBRICANT

scientifically and accurately compounded to reduce lubricating costs

CONSOLIDATED

DOOR CONTROL

7700 Consolidated Door Engines on the New York Municipal Railway



Door Engine

4200 of which are for 300 new subway cars now under construction.

CONSOLIDATED CAR-HEATING COMPANY

ALBANY NEW YORK CHICAGO

DAVIS STEEL WHEELS

Maximum Service—Minimum Maintenance Costs

Wheel removal costs and costs of turning are always supplemented by the following labor charges. (1) Cost of reapplying wheels to equipment, (2) cost of renewing or reclaiming journal brasses, (3) cost of replacing bolts and nuts every time wheels are changed, (4) cost of shimming cars to maintain coupler heights. The one-wear feature of Davis Steel Wheels eliminates all of these labor charges.

American Steel Foundries
1100 McCormick Building, Chicago

Keeping the Statio
by Means

One Car

on the road is worth a dozen in the repair shop or barn. To keep your equipment in permanent operating condition no detail can be slighted.

In the matter of choosing efficient lubricants, operating officials realize that oil costs are relatively small when compared with equipment costs.

Quality oils pay big dividends by means of repair bill reductions alone. Therefore hundreds of master mechanics use nothing but GALENA OILS.

The World's best Lubricants

latforms Clear
roper Lubricants

GALENA -OILS-

For Promoting Operating Efficiency and Economy

GALENA SERVICE

Overheated and burned bearings do not always result from improper lubrication. There are many factors in a motor that will produce heat. But it is safe to say that low grade oils will put a car in the repair shop quicker than any other cause.

Once your bearings are burned, it is hard to directly reach the cause but you can eliminate the chance of lubrication failure by standardizing on GALENA OILS.

GALENA OILS are a tested and proven product. They afford the greatest economy under severe operating conditions by increasing mileage per k.w.h. output.

You insure longer life to your equipment and appreciably lower your monthly repairs by making use of GALENA SERVICE.

GALENA OILS cost no more than other lubricants made and sold for the same purposes. When you figure the service rendered you can readily see how they cost far less.

Repairs and replacements step out when GALENA OILS come in.

There is not a single test record that shows where GALENA OILS have failed to prove conclusively their ability to give maximum service at minimum cost. Efficient operation and GALENA OILS are synonymous.

Galena-Signal Oil Company

New York *Franklin, Pa.* *Chicago*

and all principal American cities

ONDON TORONTO BUENOS AIRES MONTREAL PARIS

DURING the morning and evening rush hours, 290 cars per hour pass around the Market Street loop in San Francisco—the busiest traffic point on the coast. A few minutes' delay creates a serious tieup reaching for many blocks and affecting thousands of people.

G-E Form N renewable-pan tro
frogs, with their record of a new
installed in 40 seconds, are used
this loop. Where seconds count,
time and labor saving features of
frog are fully appreciated. Two b
fasten the pan in place—no t
pering with the wires.

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

40-

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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American Association Headquarters Situation Is Well in Hand

THERE is no reason for discouragement in the mix-up in the finances of the American Electric Railway Association disclosed by the audit of the treasurer's books now under way. While this is disconcerting for the moment, the association and the industry will benefit ultimately, due to the thorough analysis of operating methods which will at once be undertaken. The association work has expanded enormously within a few years and demands upon it have increased by leaps and bounds. The membership has responded generously with funds, but the work to be done grew faster than the machinery for doing it. This condition will be remedied. In the meanwhile, the essential activities will go on unhampered. The industry is behind President Gadsden and his colleagues to a man. If funds run low for a time, provisions will be made to finance the work. The association is recognized as vital to the industry. The present losses, while intrinsically large, are comparatively insignificant. Close ranks! Forward, march!

The Metamorphosis of the Electric Railway Shop

THERE is no question but that the maintenance shops connected with electric railway properties are undergoing a gradual but very noticeable evolution. This fact has been particularly impressed upon the men responsible for the preparation of this annual maintenance issue of the ELECTRIC RAILWAY JOURNAL.

The changes which have been brought about are due to many causes, not the least of which is the improved quality of equipment supplied by manufacturers. While it is true that some of the older equipment has made wonderful records for durability, the new equipment is superior in most characteristics. Take, for example, the motor. In this case the designers, by reducing weight, increasing overload capacity, eliminating sparking, etc., have put the modern motor in a class quite distinct from that of its predecessor. The manufacturers deserve credit for this achievement, although they have undoubtedly been influenced by complaints and constructive suggestions from their customers. Along with better motors have gone also better car bodies, trucks, controllers, heaters and the hundred and one details which go to make up a complete car.

The master mechanic comes in for a large share of the praise for improved shop practices in that he has recognized the opportunities afforded by new developments. For instance, he now dips and bakes armatures and field coils, where he did not deem this necessary or practicable some years ago. In one case at least he is dipping and baking the entire motor shells with field coils in place. Possibly in addition he is using an impregnating outfit in connection with his insulation program. He is slotting his commutators also, and he is certainly using better tools and adapting the tools to the work more skillfully than ever before.

As to reclamation work, the very mention of the term is enough to arouse enthusiasm. The possibilities of electric, gas and thermit welding and of gas and electric cutting are limitless. The reclamation department now has its established place, just like the forge shop, the wood mill or the paint shop. The writer visited one shop recently in which the welding, blacksmith and sheet-metal shop are combined in the reclamation department with an expert in charge, the work of these shops being so inter-related in modern maintenance work as to make this combination the most desirable administrative arrangement.

No Steam Railway Supply Exhibit at Atlantic City This Year

THE executive committee of the Railway Supply Manufacturers' Association has announced that the usual exhibit will not be held in connection with the annual convention of the mechanical section of the American Railway Association at Atlantic City in June. Such action has precedent, for during the war period the convention, exhibit and all, was suspended for patriotic reasons. Now the condition of the railroads and of the attendant supply business is such that regardless of the loss which the omission entails a drastic procedure is considered justified. The exhibit will be greatly missed, although the omission is no doubt warranted under present conditions. It seemed like old times during the past two years to hear the merry hum of wheels and the buzz of cheerful discussion on the pier at Atlantic City, presaging better times for the railroad business. The convention of the railroad men will now be a comparatively quiet affair. While the technical sessions and social affairs will be well worth while, they cannot but be adversely affected due to the absence of the exhibit "fans."

Electric railway men will naturally ask themselves whether this action of the railroad men will or should affect their own plans for the fall convention. It need not do so unless they are looking for a precedent for omitting exhibits. The manufacturing concerns in this field are to a certain extent the same as those making the decision to omit the June exhibit. However, the situation in the electric is different from that in the steam railway field, and in some phases it is better. Fares are rising and expenses receding slightly, and forward-looking transportation men feel sure that the trough of the wave of depression has been passed.

Under the present organization of the American Association, it is the railway men who decide the matter of exhibits, while the reverse is at least nominally true in the steam railway field. But obviously the exhibits would be a fizzle unless a large number of supply men co-operated. At the same time the railway men would not wish to exert undue pressure on the manufacturers to spend money unprofitably on the convention. It is to be hoped, however, that the plans for the American Electric Railway Association convention can be carried out. Possibly the supply men can afford one exhibit this year, and fortunately the supplies required for the October convention are much less expensive to exhibit than those which are usually gathered together for the inspection of the steam railroad men in June.

Paying for Work Done, Not Time Put In

SEVERAL reasons stand out as contributing conspicuously to the success attained in the shops in Milwaukee with a premium system of pay, which is treated in the article by J. H. Lucas elsewhere in this issue. They are considered worth this special summary:

Great pains are taken in setting up the standard time allowance on a particular job and then this standard rate is never changed. Extra pay is commonly earned, and it is received promptly with the semi-monthly pay. The check-up on the man who fails to equal the standard time brings to light any unfair condition and acts as a spur to the poor workman. The workmen like the system, because if they have skill it brings them immediate recognition, and as their confidence in the system has been gained, they are not afraid to display it. The possibility of poor workmanship because of too much speed is eliminated by a thorough inspection system. The amount of record-keeping by the workman is very small, as is also that of the clerical help required to handle the record system in the head office. The foreman is rewarded in proportion to the amount of work he gets done on a premium basis, so that he is interested in extending the plan. He does not profit from any excess earnings of the men, nor does he profit from standard rates set too low. The rate is subject to his approval and he is interested in having this rate perfectly fair.

After six years of experience in the Milwaukee shops, Mr. Lucas' views of the general worth of some such system of rewarding labor in proportion to the work done are of unusual value. In discussing the subject in a broad way with the writer, he made this significant remark: "Let the electric railways install the Taylor system, piecework, profit-sharing or whatever they will, just so they get away from the hopelessly degrading influence of the plan of flat hourly pay for labor regardless of the individual capability, which unionism has succeeded in forcing so far forward in the last few years."

Seemingly, there never was a time more propitious than the present for the introduction or revival of efficiency methods. Managements are seeking for economy and labor is in a mood to receive with favor any scheme that will assist in retaining the present earning ability. Wages cannot be cut without calling immediate attention to the reduction of rates of fare, but there is a possibility of reducing costs through better efficiency and thus recoup past low earnings for a while. And anyway, far-seeing managements are not anxious to reduce the earnings of their employees if they can find a way to justify the present high labor expenditures, for there is a very direct economic advantage to a company in having employees who earn high wages.

During the last few years wages have increased to double and treble what they were before the war, and yet in many instances the output has been cut in two. We recall one instance where unionism forced a change in a large shop from an extensive use of piecework to the flat hourly pay basis, with the result that the total earnings of many of the employees were substantially
reduced and the maintenance costs of the compar
increased on the average 75 per cent, and on som
as much as 200 per cent. It should be said in th
nection that the unionization of the shop is und
to have been largely a matter of coercion, for
cent of the men did not want the change.

In Milwaukee the premium system proved to
most valuable bulwark against this cutting of
tion. The standard rate held firm, and while the
of non-premium work increased during the time
efficient labor, the company had the records an
whom it was best to lay off when the time for re
ment came.

Too many of the "old timers" in our busin
afraid of "efficiency" or the "efficiency engineer.
the results of a common-sense study of the wor
in any shop, looking toward a systematic and or
routine, will bring to light so many possible eco
so many existing inaccuracies and wastes, that t
ing will probably be startling. Altogether, we f
Mr. Lucas' estimate of 25 per cent as the saving
by the company is a very modest claim. And wi
possibilities in sight, present business condition
this an excellent time to go after better labor ef
in the shop and elsewhere.

How Can Maintenance Costs Be Reduced?

JUST now electric railways are facing the prob
maintaining their equipment with little mone
easy way of offsetting the decreased revenues
making drastic reductions in maintenance expen
Shop forces all over this country are engaged in
ing up the various parts of equipment in order t
them last a little longer, and the need for ad
rolling-stock is being met by rebuilding obsolet
All realize that this is but a temporary expedie
that efficiency and ultimate economy are being
ficed, but the reduction of maintenance expenses
lutely necessary for most roads just now. Some
means by which maintenance expenses can be
on a sane basis are by doing away with waste la
by increasing the present output of the shop equ
available. Waste labor is due to lack of proper
vision and looseness of organization. To obt
best results, maintenance work must be plann
tematically. There must be closer supervision
workmen and of the materials used, and attentio
be given to the proper distribution of the limit
terial and supplies available so as to bring ab
most efficient results. Another factor tending
duce this looseness of organization is the unce
as to just what should be undertaken in the
program. Only through a general supervision,
all departments can be made to co-operate close
the greatest economy be obtained.

For the moment, the installation of new and
machinery seems out of the question on most ro
the present shop equipment should be made to se
purpose more effectively. One method by whi
chinery output can be increased with the present
ment is by the application and use of time-savi
and fixtures. A detailed study of the individu
will show what operation is consuming the mos
In many cases a little ingenuity will suggest some
jig or fixture which will materially reduce the ti
thus produce a substantial saving. Present sh

ency on a man-hour basis is entirely too low, and the resent reductions in shop forces make it all the more mportant to increase by every possible degree the orale of the men. Men who show the proper interest n their work should be advanced consistently, and they vill be found to work more earnestly and enthusiastially. A careful consideration of such questions as hese will undoubtedly provide for getting better and nore service from all the important factors, men and nachinery.

he Present Trend of Way Department Affairs

WHILE the activities of way departments were restricted during 1920 there was a distinct imrovement in them over 1919. There was a 25 per cent ncrease in amount of new track built and the amount of rack rebuilt did not fall below that for 1919. There is ncouragement in these facts, particularly in view of he continuation of the high prices for rails and other onstruction materials which prevailed during 1920. It vould not have been surprising if the track activities ad fallen below 1919; but actually they more than held heir own.

Prices are now on the decline, due mainly to the eduction in labor cost which has been gathering force n all lines of endeavor. Much more favorable condiions are found in the track labor market and some ompanies have cut this item by 20 per cent. The signs oint to even greater reductions. Meanwhile the track ayrolls are at a minimum just now and no maintenance vork other than that of the most urgent nature is eing carried on.

With the decline in costs for labor and material will ome an enlarged opportunity for expenditure on track projects which are urgently demanded by the deferred naintenance which has been piling up. Combined with he betterment of fare conditions which is gradually naking headway, the reductions in costs should lead to greatly extended track programs and the year 1921 promises to be one of increased activities in the way lepartment.

A greater amount of attention was paid last year to he fact that tracks may often be overhauled and put in serviceable condition to cover a period of five years or nore at a reasonable cost and without complete recontruction. The answer to the question, When is a track worn out? has been sought carefully and some surprising results have followed. This paper has recently published several articles describing methods of rehabilitation of apparently wornout tracks and an inspection of some of the jobs described leads to the conclusion that a careful study of the economics of track life on any property will tend to convince engineers of the unwisdom of considering tracks as worn out and needing complete renewal until every angle of investigation and computation has been exhausted.

The extent to which the arc welder and rail grinder have been used in prolonging the life of tracks and special trackwork has been constantly observed during the past year. These two pieces of apparatus may lay claim, unchallenged, to pre-eminence as labor and expense-saving devices. Meanwhile there have been several developments in labor-saving devices which indicate that the end is not yet in sight and that way engineers are still capable of reducing costs. The motorization of the way department is on the increase. Cumbersome, time-consuming work cars and horse-drawn vehicles are being replaced by suitable motor trucks. By means of these, costs for handling materials are being greatly reduced and work is speeded up owing to the more frequent service obtained. A particular development along this line is the motor truck carrying a crane for handling heavy material.

An increasing tendency toward the use of substitute ties for tracks in streets has been noted and there is no doubt but that there is a field for them. However, there is a current of opinion prevailing which suggests that track engineers should investigate the design of such ties more carefully with the view toward determining results obtained from existing designs and attempting to guide the design along proper channels in accord with good engineering principles.

An Important Job—That of the Equipment Engineer

ON AN increasing number of electric railway properties a functionary who is proving himself a money saver is the equipment engineer. He differs from the master mechanic in that, in general, he has no routine duties of an administrative nature, and preferably he is a man who has had both theoretical and practical training. His function is to solve equipment problems of a technical character, and he has for his principal duty that of locating opportunities for savings. Another thing that he can do is to work up in economical and practical form the suggestions which the master mechanic, the foremen and the skilled workmen make to him from time to time.

Every practical man on a railway property knows that there are wastes going on around him. Even practices which are not actually wasteful are susceptible of improvement. But to know that there are chances for saving is one thing and to realize on these opportunities is another. It requires more time for the latter than is usually available unless some one is detailed for the purpose and relieved of other responsibility. A first-class man at this task ought, on a property of average size, to earn his salary many times over each year.

There are, of course, many small properties where an equipment engineer is out of reach, or seems so. Then some one else must perform his functions. The master mechanic must do double duty, without, however, letting one part of his work interfere with the other. Care in this respect is needed, for the state of mind required for solving technical problems is quite different from that required for "running" the shop. It is better to have a separate man for the purpose, if possible, even if supereconomies have to be practiced elsewhere to accomplish this.

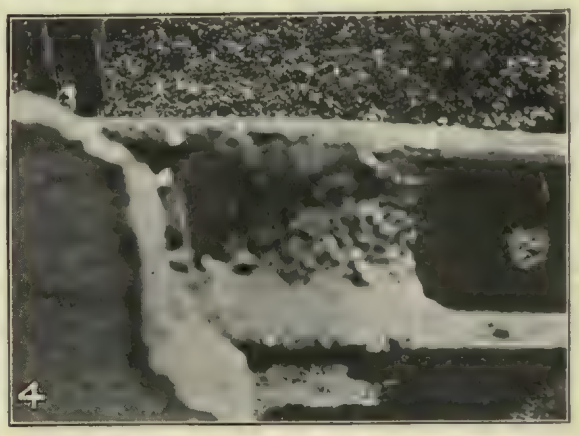
Quotation from the Federal Electric Railways Commission Report

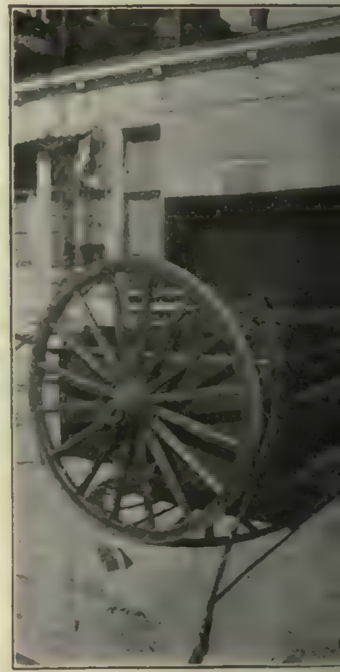
No. 12

THE labor policies of the electric street railways will in the future be of great importance as an element in the restoration and the permanent maintenance of their credit. The full co-operation of labor is essential to the highest prosperity and usefulness of the industry. This is particularly true because in the case of the street railways the employees who immediately handle the service come into direct contact with the people who consume that service.

Much can also be done toward reduction in the cost of operation by developing the proper spirit of co-operation with employees.

Welding Has Proved a Life Saver for Small Electric Roads





1—Set-up for thermit weld.
2—Cutting cast iron with oxyacetylene to prepare for mold.
3—The reaction taking place.
4—Completed weld before cleaning.
5—Repair to crossing by arc welding.
6—Dynamotor type arc-welding machine.
7—Seam-welded joint on 7-in. groove girder rail.
8—Reciprocating rail grinder.

Track Labor Savers for Small Railway

BY A. J. STRATTON
Superintendent Maintenance of Way Eastern Pennsylvania Railways, Pottsville, Pa.

The Application of Labor-Saving Tools and Track Machinery on Small as Well as Large Systems Has Produced Far-Reaching Economies—Also, Tools Will Not Continue to Operate Without Proper Inspection and Maintenance

THE electric railway industry has during the past five years undergone a great shaking up. Economies have been effected that formerly seemed impossible. Materials and labor reached undreamed-of price levels. The acute shortage of both commodities directed the attention of railway executives to means of conserving material and multiplying the efforts of labor. In the province of the track and roadway department the shortage was acutely felt. Tracks that would in times past have been reconstructed were rehabilitated and are functioning today and will continue to do so for years to come. Much of this work, however, would not have been possible had it not been for the use of labor-saving equipment and track machinery designed to prolong the life of the track.

It is not the purpose of this article to enumerate the various labor-saving devices in use on the larger systems of the country. The crane car, the pavement plow, portable welding units, elaborate storage yard machinery and other special equipment have been described many times in the columns of the ELECTRIC RAILWAY JOURNAL. The utility of these tools is not questioned, but the smaller company cannot afford to buy equipment of limited or infrequent use. When new equipment is bought for the track and roadway department the management is usually assured that the tool is going to be in use most of the time during the working season.

WIDE APPLICATION OF WELDING

Probably no tools have contributed more to the successful rehabilitation of tracks than the various types of arc welders. Joints may be welded, cups and dishes filled in, railroad crossings restored, the life of special trackwork prolonged, bonds applied and many other economies effected. The portable grid-resistance type of welder was placed on the market about ten years ago. The wide range of possibilities and the low first cost of the apparatus so appealed to track engineers that almost every electric railway in the country became the possessor of one or more of these equipments. Overindulgence in electric welding during the next few years was convincing, however, that while not a remedy for all track troubles, it had a wide sphere of utility. The introduction of the motor-generator or dynamotor sets further extended the really constructive work that might be accomplished by this process.

The grid resistance type of machine is probably unexcelled for heavy and rugged welding. The absence of moving parts and consequent low maintenance, the portability and the ease of operation are some of the points in its favor. On the other hand, the fact that the rail is always negative with respect to the generating equipment does not permit certain kinds of welding to be done. The fluctuations of line voltage, too, often interferes with production. The metal electrode is most successfully used with this type of machine. The dynamotor type of welder operates with the rail positive to the generator of the machine, making possible the seam weld joint, which is, however, patented. This joint has much to recommend it and is enjoying wide use. The maintenance of this type of machine is more costly than that of the grid-resistance apparatus. The cost of current, however, is much less. The track and roadway department is not, on the majority of properties, charged with the current used by track tools, but for those interested the following data are submitted: On a test to determine the amount of energy required to melt a pound of low-carbon steel, it was found that the grid-resistance type of machine used 10.8 kw.-hr., while the dynamotor consumed 4 kw.-hr. The test covered actual working conditions over several days, the metal being weighed and the energy metered with a kilowatt-hour meter.

The application of thermit welding to track construction is now thoroughly established. Joints may be welded, special trackwork made on the property, broken pieces of special trackwork may be repaired and truck-frame and other heavy welding repairs may be done in the shops. To the company possessing a pneumatic tie-tamping machine or other adequate portable air-compressor unit the cost of acquiring additional equipment for a thermit welding plant is small. The illustrations reproduced herewith show the set-up for the repair of

COMPRESSED AIR EQUIPMENT FOR REMOVING CONCRETE IN TRACKS

a broken iron-bound, guarantee mate, the break occurring through the rail about 1 in. from the cast-iron frame. The mate was removed from the track and the compressor for furnishing air to the burner used for drying the mold was mounted in a farm wagon and placed alongside of the track. The weld was successful at a cost of less than one-third of the cost of a new piece, and owing to the fact that the weld was in the nature of an experiment the cost was unduly high.

Oxyacetylene Used for Cutting and Bonding

It would not be fair to leave the subject of welding without some reference to the use of oxyacetylene as a cutting and welding agent. Owing to the availability of electric current, its use in track welding has been limited in favor of arc welding. In the shops and for bonding it has a wide application. It is superior to the electric arc for cutting and can be used profitably in trackwork for this purpose. A competent operator can cut out broken joints in connection with track repairs that are of a more or less temporary character in a fraction of the time that the work would take if the hacksaw were used. The cuts can be made so that a reasonably close joint is obtained. In addition to this, holes may be burned in the web of the rail for the bolts, the whole operation requiring not over a quarter of an hour. When special work has to be replaced at night when the cars are out of service, or when the time to perform this work is limited, the cutting tool is very useful in cutting bolts and in making cuts for temporary connections.

The electric welder and the rail-grinding machine are inseparable for many track repairs. The reciprocating grinder is a valuable tool for reducing corrugation, but is high in first cost for the small property. The various types of wheel grinders that are derailed easily are operated at a small expense together with the electric welder in the repairs to special work and cupped joints.

Among the least costly and yet most useful tools that should form a part of every electric railway's track equipment is the portable blacksmith outfit. Track departments are frequently forced to depend on the shops for work of this nature. Too often the master mechanic finds more work for his blacksmith in his own department than can be turned out, with the result that the work of other departments must wait, or not be done at all. A portable forge and anvil, with a dozen inexpensive tools that can be moved from place to place as the occasion demands, can maintain the track tools in good condition, make repairs to open track special-work layouts and, most important of all, make the joint plates used on repair work really fit. When the failures of joints in paved streets that are caused by the neglect to make the joint as nearly as possible mechanically sound are taken into consideration the blacksmith outfit rises in importance.

Convenient Work Car Is Valuable

Almost every electric railway has some sort of a work car. It may be a big steel-underframe crane car, capable of hauling several trailers or steam road equipment, or it may be a plain single-truck platform car, that is just "car." The single-truck work car, with sides that may be raised or lowered and having a capacity of about ten cubic yards, is a valuable tool to any roadway department. It cannot, of course, carry 60-ft. rails, but if properly motored can haul a fair load on a rail truck. Owing to their ability to get through traffic expeditiously, these cars usually have the approval of the transportation department. In handling small amounts of material, tools and supplies they are superior to the double-truck cars and can be operated at much less cost. Now that the single-truck open car has nearly become a thing of the past, the conversion of a few of these into work cars would prove of real assistance to many track departments. One of these changes just referred to was made last year by a small Eastern property at a total cost of $126. This included the cost of removing the old body and adding a new floor and drop sides. The trolley stand is carried by a post in the center of the car and braced with insulated steel rods which run to each end and are located so as not to interfere with material carried.

Pneumatic tie-tamping outfits have not only increased the output of work per man in this particular but have improved the quality of work done. Their best work is accomplished when rock or slag ballast is used, although they may be used successfully with gravel or cinder ballast under careful supervision. The utility of these machines is not confined to tamping ties. With a pointed tool, brick or granite block pavement with grouted joints may be quickly removed, and the blocks or bricks cleaned. The concrete track foundation also may be rapidly broken up, using a small part of the force of men otherwise necessary. An illustration shows an experimental outfit built several years ago. A compressor that was being displaced in the shops was mounted on a car and a small air tool purchased. The tool was not of sufficient size, but the work performed

LARGE CONCRETE MIXER OPERATING ON TRACK BEING CONCRETED was more than equal to that of four men engaged in the same work of removing concrete paving foundation. In connection with the use of thermit welding, or where compressed air is used in any manner, this machine becomes a valuable adjunct.

SMALL CONCRETE MIXER HAS ITS PLACE

The small concrete mixer with a capacity of a quarter yard or less has a distinct place with all companies having a considerable mileage in paved streets. It should be equipped with a loading skip and preferably should be gas driven. The electric drive restricts the use of the machine to areas served by the electric circuits furnishing the proper voltage for the motor. The machine is scarcely large enough to use on extensive new paving work, but will rapidly pay for itself on paving repairs and in the construction of the numerous small concrete jobs that originate in the power house or shops. When used to replace concrete removed for the repair of joints the machine and the concreting material can be placed on a work car and the work can be performed under moderate traffic, thus avoiding the placing of the materials in the street at all until finally dumped in the excavation.

The electric drilling machine, as applied to the drilling of joints and tie-rod holes, was one of the first labor-saving tools to be adopted on electric lines. When properly used this tool is a real labor and time saver. If properly inspected by a competent mechanic and fused so that in the event of electrical trouble the motor will be protected from damage the electric drill will operate at a minimum of expense.

For a company operating considerable city street or suburban mileage the use of the light automobile truck offers an attractive proposition. First, it may serve as a vehicle for the roadmaster or general foreman, thus enabling him to be rapidly transported from place to place, and to cover his territory more times than would be possible if he depended on trolley cars for transportation; second, it enables the driver of the truck to rapidly move tools or small amounts of material from one job to another, thus relieving the work car of this duty. At the present time when the cost of operation per car-mile has reached so high a level every car-mile saved in a day's operation of work cars means dollars and cents.

In conclusion, the fact should not be lost sight of that no power tool can continue to operate long without proper inspection and maintenance. As a rule this should be the work of skilled mechanics. The tendency of the average trackman is to use a tool until it breaks down. An inspection at intervals of all power-driven equipment will often take a machine out of service for minor repairs which if allowed to lapse would put the machine out of commission for a much longer period of time.

POINTED TOOLS WITH PNEUMATIC TIE TAMPERS WERE USED TO CLEAR THIS ROADWAY

RECONSTRUCTED SINGLE-TRUCK OPEN CAR USED FOR TRACKWORK

Leather Mats Solve Cold Floor Problem

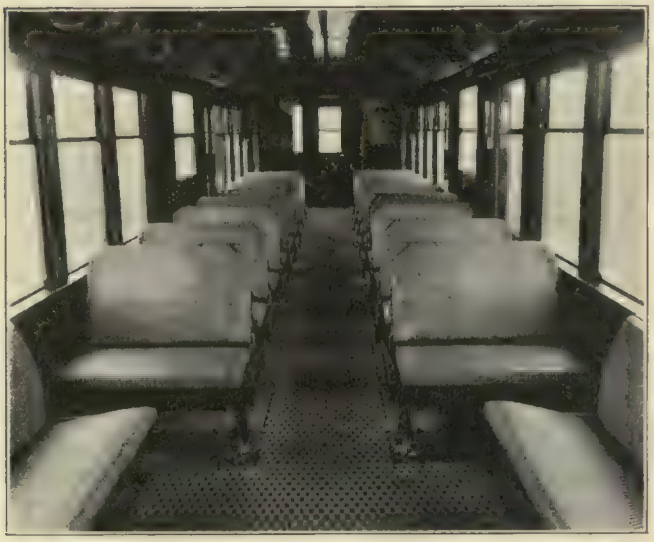
The Chicago Elevated Railways Are Installing These Leather Coverings to Overcome Passenger Objections to Composition Floors—Other Advantages Which Accrue from Their Use

In ORDER to make the last all-steel cars purchased by the Chicago Elevated Railways entirely fireproof, composition floors were specified. It developed during the first winter these cars were in service that there were numerous complaints about the floors being cold. Investigation was made to determine whether the floors really were colder than in the older type cars, for the composition floors had been well insulated. While the thermometer tests showed that the floor was actually no colder than the wooden floors in other cars, and that the difference in temperature between the air at floor level and at head level was no greater, it was nevertheless determined that apparently because of the greater conductivity of the composition floor it really did feel colder to passengers. Another explanation given was that on the composition flooring a passenger's shoes are in full contact with a perfectly flat surface, while with a car with wooden floor and floor strips, only a comparatively small part of his shoes is in actual contact with the floor, the air spaces between floor strips forming an excellent insulating material.

It was also found out in the investigation that the composition floor is slightly porous and consequently on wet days it absorbs some moisture and perhaps feels colder on this account. An effort was then made to overcome this porosity by applying a waterproofing compound to the floor after it had previously been thoroughly dried out for twenty-four to forty-eight hours by turning on all of the heaters with the car closed and standing inside the shop. After this waterproofing had dried, the surface of the floor was painted with a colored cement paint. This process of treating the floor was followed annually for some three years, and while it did improve the situation, it did not do away with the complaints of cold floors.

Considerable study was then given to the problem of using some kind of floor matting or wooden strips. Rubber matting, cocoa matting, steel matting, leather matting and floor strips installed on top of the composition flooring and various other remedies were all tried. It was obvious almost from the first, according to H. A. Johnson, organization engineer, that the leather matting was the best suited to the purpose, but the objection to this was its high cost. However, after trying out all of the other suggested schemes and mattings, ten cars were equipped with the leather mats last year and this year additional cars are being equipped.

On cars equipped with longitudinal seats, the matting is used in a wide strip, extending from one bulkhead to the other and wide enough so that it reaches a few inches underneath the edge of the seat cushions so that a passenger's heels rest on it. In cars equipped with cross-seats, the mat is arranged to cover the aisle space between the seat pedestals, and additional pieces of matting, hinged to this main aisle strip, extend in between each seat. An arrangement of the matting for the longitudinal seats at the ends of these cars is made similar to that described for the all-longitudinal seat cars. In cars of both types of seating arrangement, the matting is laid down in three to five sections per car so that it may readily be rolled up and handled by one man. With the matting for the cross-seat cars, the pieces extending between the seats are simply folded over the aisle piece and rolled up with it to remove from the car. In order to prevent passengers from stumbling over the ends of the mat, which is about ⅝ in. thick, a wood strip beveled off was fastened to the floor at each bulkhead and the first section of the matting laid on the floor against this strip. No fastening whatever for the floor mat is required, as its flexible chain-link construction and weight makes it lie perfectly flat with apparently no tendency to get out of place.



LEATHER FLOOR MAT AS USED IN CARS OF CHICAGO ELEVATED RAILWAYS

Mr. Johnson says the leather floor mat has very satisfactorily solved the problem. Not only is the leather a very good insulator of both heat and electricity, but it has the air space openings which improve the heat insulating properties and it has a very high anti-slip property. The advantages of the matting are particularly noticeable on wet, snowy days, for it provides a place for the water, snow and dirt to fall where it is not tramped in by passengers. Without the matting on such wet days, water accumulates into puddles on th composition flooring, sometimes clear into the center c the car, through which passengers must walk. Th wearing qualities of the leather mat, inasmuch as i is made of leather punchings placed on edge, is though to compare favorably from the experience thus far wit that of the wood strips on the ordinary wooden car floo Incidentally, the Elevated companies recently replace some wood floor strips which had been in service fo more than twenty years without renewal. If the indicated wearing quality of the leather mat is proved th first cost may appear in a different light. The presenc of the leather mat in a car adds slightly to the cost c car cleaning, though the fact that it is readily remove for cleaning purposes minimizes this extra cost. Wit the floor mat removed, the smooth, sanitary advantage of the composition floor are retained and the mat itse is easily cleaned after it is taken out of the car by turning the hose on it. The mats are used only during th winter months, and are stored for the eight warme months so that this additional cleaning trouble an expense is encountered only four months of the year.

The use of this type of floor mat is also being considered for use on the interurban cars of the Chicag North Shore & Milwaukee Railroad as a substitute fc the corrugated rubber floor mat used on the newer typ cars and the alternate steel link and composition lin mats used on some of the older type cars.

A Loose Band Makes Bad Music

A LARGE railway company had been successfull operating a number of large motors for severa years with practically no failures of any kind. Th company was congratulating itself upon this lack c trouble, when one of the armatures failed, and upo investigation the failure was found to be due to armature band trouble.

Indications were that the core bands on the armature in question had worked loose, thus allowing movement of the windings and finally causing the failur The first thought was that probably the material in th bands was of an inferior grade and had stretched, bu tests indicated that this was not the case. In an attem to obtain information as to the probable cause of th failure another machine was opened up and the banc inspected. It was noted that the core bands wer slightly loose, several of them being cut off, and it wa then found that the insulation under these bands ha become dry and brittle.

With this information at hand the following theor was advanced as being responsible for the troubl When the insulation is placed under the band it is so and the band is tight. After the motor has been in service for some time, however, the working temperatur of the motor cause this material to dry out and shrin allowing the bands to become loose. It was then decide to replace the strip of insulation material under th core bands with a strip of tin, and this change, aft a number of years of service, was found to give ver satisfactory results.

As a result of this experience all armatures, durin the overhauling of these motors, have been rebande replacing the insulation under the core bands with strip of tin to which the band wires are secure soldered. This results in strong and durable banc which have not given any further trouble by workin loose in service.

Utilizing Figures to Keep Down Costs

Mechanical Department of New York State Railways Rearranges Data from Auditor and Storekeepers in Special Forms Suitable for Stimulating Spirit of Economy in Shops and Carhouses—Organization in Divisions Utilized to Develop Competition Among Several Parts of Property

AN ILLUSTRATION of the ways in which the periodical reports prepared by the accounting division of an electric railway organization can be utilized to advantage in promoting economy is furnished by the equipment department of the New York State Railways. This company operates city lines, principally in Rochester, Syracuse and Utica, and interurban lines in the same territory. The administrative headquarters of the system are at Rochester, where the president, James F. Hamilton, is located, but for operating purposes there are two main sections, respectively the Rochester lines, under Mr. Hamilton's managership, and the Syracuse-Utica-Oneida lines, of which B. E. Tilton is general manager. J. F. Uffert, located at Rochester, is superintendent of equipment for the entire system, and H. S. Sweet, with headquarters at Syracuse, is engineer of equipment. H. C. Kaercher is master mechanic Rochester lines; J. F. McInerney, master mechanic Syracuse and Oneida lines, and F. T. McCann, master mechanic Utica lines.

WHAT IS DONE WITH THE RECORDS

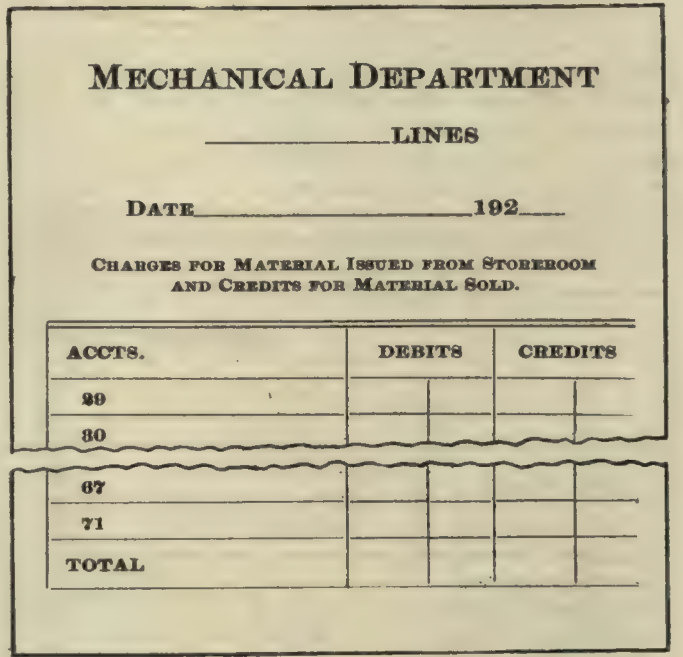
As on all electric railways, the auditing department furnishes monthly to the equipment department the records of operating expenditures on the property classified according to the standard system of accounts. From these, the items of interest to the master mechanics are totalized by divisions and sent to the master mechanics in the various cities for comparative study, together with comment, if such seems necessary, from the superintendent of equipment. A similar procedure is followed with the accounts of jobs involving capital expenditure, showing the amounts expended during the month and the unexpended balances.

Next, in order to permit the master mechanics to gage their progress, a combination sheet is prepared showing for each division the cost of maintaining equipment, that of car operation and the total operating expense, with percentages of increase or decrease for the same month over a period of four years. This not only permits cost tendencies to be determined but also shows which shops are making the best records and stimulates emulation.

To make the data still more interesting they are worked over to show the costs in cents per car-mile and per car-hour for the current and preceding two years. The sheet containing this information also shows the percentage of the company's gross revenue and the percentage of the total operating expenditures which are used by the equipment department.

All of the above figures are given in tabular form. They could be easily graphed if desired, but Mr. Uffert finds the tabular form simpler and more effective for his purpose.

Coming now to the material items, which more directly affect expenses, possibly the most important record is the monthly report on consumption of brakeshoes, lubricants, trolley wheels, lamps, carbon brushes, etc. These show the items, both quantities and costs, for each carhouse on the entire system. Costs are calculated with arbitrary unit prices so as to permit comparison on an equivalent basis, otherwise they would not furnish a measure of maintenance efficiency. The costs can readily be translated into current values, if desired, for comparison with data secured from outside the property. These figures are also totalized for each division and are put into the unit forms of car-miles operated for each item and cost per thousand car-miles.



MECHANICAL DEPARTMENT

______LINES

DATE______192__

CHARGES FOR MATERIAL ISSUED FROM STOREROOM AND CREDITS FOR MATERIAL SOLD.

ACCTS.	DEBITS		CREDITS	
29				
30				
67				
71				
TOTAL				

STOREKEEPER'S FORM FOR REPORTING MATERIALS CHARGES DAY BY DAY TO MECHANICAL DEPARTMENT

CARHOUSES RATED BY BRAKESHOE WEAR

To induce rivalry among the carhouses, the item of brakeshoes has been selected as a basis of carhouse rating, brakeshoe wear lending itself better than any other item for this purpose. To furnish the information for this rating, and, of course, primarily to reduce brakeshoe consumption, all scrap brakeshoes are inspected to determine the scrap worth and the causes for scrapping. The latter are classified as: (1) Worn out; (2) tapering; (3) overlapping, and (4) wedged. The percentages of total wear secured are calculated and tabulated, with data from the last report included for comparison, and the carhouses are listed in order of merit. The operation of this plan has secured some remarkable percentages of wear, and the tables show clearly how much can be saved by careful watching of shoes, turning them at the proper times, etc.

The local master mechanics post these records to stimulate the carhouse inspectors to make their best efforts. The posters show not only the ratings by carhouses but also by lines.

It is not practicable to furnish the master mechanics with relative ratings on other items, but as much detail as possible is given them to enable them to determine where the "leaks" are. For example, in lubricants there are three kinds classified, that is, car oil, compressor oil, and gear lubricant. Data are also supplied on wheels, field coils, gears and pinions. All of these records cover not only the preceding months but also the year to and including the current month.

In order to permit a comparison of labor items, weekly reports are furnished by the master mechanics of the present numbers of employees on their rolls. The central equipment office compiles these with the corresponding numbers for two preceding years. Weekly payroll reports are also prepared showing increases or decreases over the preceding year. As a check against these tabulations the accounting department furnishes weekly reports of payrolls and names on the lists, showing increases and decreases with respect to preceding reports both for divisions and the whole system. The mechanical department office then prepares for the master mechanics weekly payroll reports showing the numbers of men on the department payrolls of all divisions, the amounts of these payrolls, the total company payroll, the increase or decrease of the equipment department labor items for each division and the whole, the same for the total company payroll, the percentages of increase or decrease for the equipment and other departments and for all departments and the percentage that the equipment department payroll is of the whole.

CO-OPERATION WITH THE STOREKEEPER

Every day the storekeeper for each division sends to the equipment office a statement, by account numbers, of charges for materials issued from the storerooms. This information is sent on a 3½ in. x 6 in. ticket like that reproduced. It contains also credits for material sold. These data are totalized daily in the office from the beginning of the month to date, permitting an almost instantaneous approximate statement to be made of the expenditures and also the necessary corrective measures to be taken to prevent totals from getting beyond control.

When special campaigns for keeping down expenses are under way, comparative monthly figures are compiled and cumulative totals are furnished to the master mechanics from day to day.

THE REPEAT BOARD AND ITS FUNCTIONS

A conspicuous chart in the office of each master mechanic is what is known as the "repeat board." This is a chart with a horizontal space for each car and a column for each day of the month. Every time a car is "pulled in" or "changed off" or is crippled on the line an entry is made and the nature of the defect is indicated by an appropriate symbol.

FORM N-804

REPORT OF CARS TURNED IN

_______________192_

CAR HOUSE	E. MAIN	PORTLAND	STATE	LAKE	TOTAL CITY	ROCHESTER AND SODUS BAY	R. & E.	TOTAL INTERURBAN	TOTAL	CAR HOUSE	E. MAIN	PORTLAND	STATE	LAKE	TOTAL CITY	ROCHESTER AND SODUS BAY	R. & E.	TOTAL INTERURBAN	TOTAL
Average Number of Cars Operated Daily										Push Buttons									
Percentage Turned In										Register equipment									
Air Compressor										Resistance									
Light circuit										Water low									
Motor case										Inspected and found O.K. by barn men									
Motor leads and Cables										TOTAL									
Motor suspension										Previous									
Pinion										Increase									
										Decrease									

FORM USED FOR COMPILING DATA REGARDING PULL-IN CAR DEFECTS

Reports of cars turned in are compiled each week and copies are sent to the several carhouse foremen. In these defects are separated into mechanical, electrical and man-failure, and comparisons are made with the preceding year. Consolidated reports by carhouses and divisions are also made up with data put into the form of percentages and arranged in order of merit. The master mechanics meet monthly to consider these reports and other matters of interest. The meetings are held in different places, but generally in Syracuse, which is centrally located.

The various reports described above look rather formidable as listed. They are, however, very simple and require but part of the time of two clerks in the central office and the usual clerks at the several shop centers.

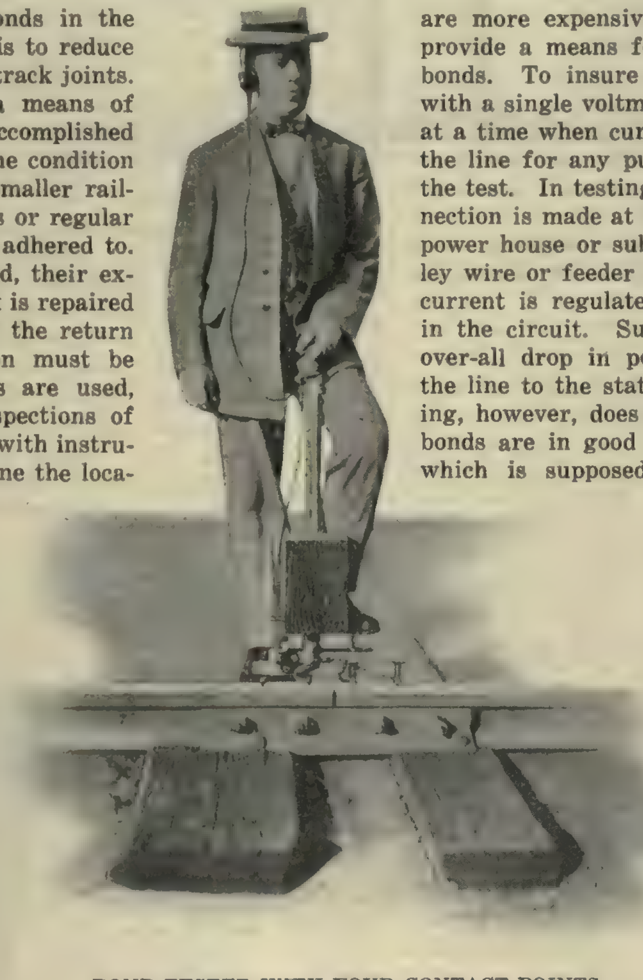
Few printed forms are required; the two which are reproduced are typical.

Portable Bond Testers

The Primary Object of Testing Bonds Is to Locate Those in Poor Condition, so that Proper Repairs Can Be Made—Portable Instruments Afford the Most Effective Means for This Class of Testing—Convenient Tables for Use of Men Making Tests Minimize Calculation and Assist in Locating Bad Bonding

By G. H. McKELWAY
Engineer of Distribution Brooklyn (N. Y.) Rapid Transit Company

THE object of installing bonds in the tracks of electric railways is to reduce the voltage drop across the track joints. Electrical instruments provide a means of seeing how well this has been accomplished and for accurately determining the condition of the bonds. On many of the smaller railways the practice of making tests or regular inspections of bonding is seldom adhered to. When once the bonds are installed, their existence is forgotten until the track is repaired or relaid, unless the condition of the return circuit becomes so bad attention must be given it. Where exposed bonds are used, some railways make periodic inspections of the bonds instead of making tests with instruments. Such inspections determine the locations at which bonds have been stolen, the terminals have loosened or the strands have become broken to such an extent as to justify rebonding. Even where concealed bonds are used, a few companies rely upon inspection rather than testing for determining their conditions. In the making of such an inspection a method sometimes used is to note the temperature of the joints. The common practice is to make such an inspection just after or during a light fall of snow. The heating at joints will melt the snow away, so that poor bonding can be readily located. Such an inspection can only be made during the winter. However, some railways have tried this method at other times by requiring an inspector to feel each joint and thus judge of its temperature. Such a method is almost valueless, however, as the results obtained are very unsatisfactory as compared with those obtained from the use of proper instruments.



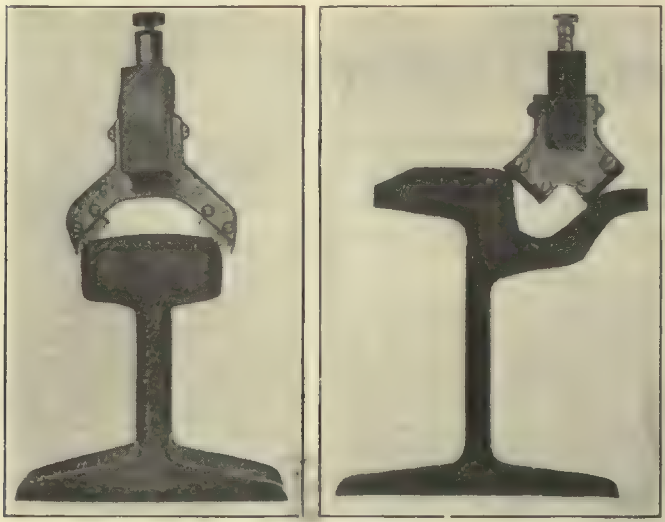
BOND TESTER WITH FOUR CONTACT POINTS

MAKING TESTS WITH A VOLTMETER

One of the simplest methods of testing bonds with an instrument is to use a voltmeter and determine the drop of potential, either for the line as a whole or across individual joints. The first method shows how much power is being lost in the lines, but does not indicate whether this loss is the result of many joints in an average condition or a very few joints with bonds in bad condition, nor does this method give any information which will aid in locating badly bonded joints.

Tests on the individual joints take more time and are more expensive to carry out, but they provide a means for definitely locating bad bonds. To insure accuracy for tests made with a single voltmeter, they should be made at a time when current is not being used on the line for any purpose other than that of the test. In testing a line as a whole, a connection is made at the end farthest from the power house or substation between the trolley wire or feeder and the track rails. The current is regulated by inserting resistance in the circuit. Such a test gives the total over-all drop in potential from the end of the line to the station busbar. A low reading, however, does not prove that the track bonds are in good condition, as the current which is supposed to return through the rails may return to the station by following water and gas pipes, lead-covered cables or the rails of intersecting or adjacent lines. When the test is made on each individual joint, it is not necessary to shut down the line. A difficulty sometimes experienced is caused by a fluctuation of the current. Readings taken under these conditions give but an approximation of the drop and should not be used for comparison, but will be sufficiently accurate to determine the location of very badly bonded joints. By the use of two voltmeters, one connected across the joint and the other connected between two contacts on the uncut rail a few feet apart, the drop of potential across the joint can be compared with that of the known length of unbroken rail. By reading both meters at the same time the tester gains accurate data.

This is a deservedly popular method, and to lessen the difficulty of reading the two meters simultaneously and to save space and weight, the two meters are sometimes combined and placed within a single case. Many prefer, however, to have the tests made by two men, each one reading one meter. With the two-voltmeter test the calculation necessary for determining the length of unbroken rail which would have the equivalent resistance to that of the joints is usually done later at the office and not in the field.



INVERTED AND UPSTANDING "V" CONTACTS

A means of avoiding calculation is to furnish the testers with a table showing the maximum reading of the meters placed across the joints for any readings taken on the uncut rail, if the joint is to be considered a good one. If the reading obtained is higher than this maximum, the joint is either marked or located in the notes so that it can be readily found again for repairs or rebonding; if the proportion between the readings is less than the maximum, no record need be kept unless it is desired to have such a record of all the joints for comparison with readings taken at other times.

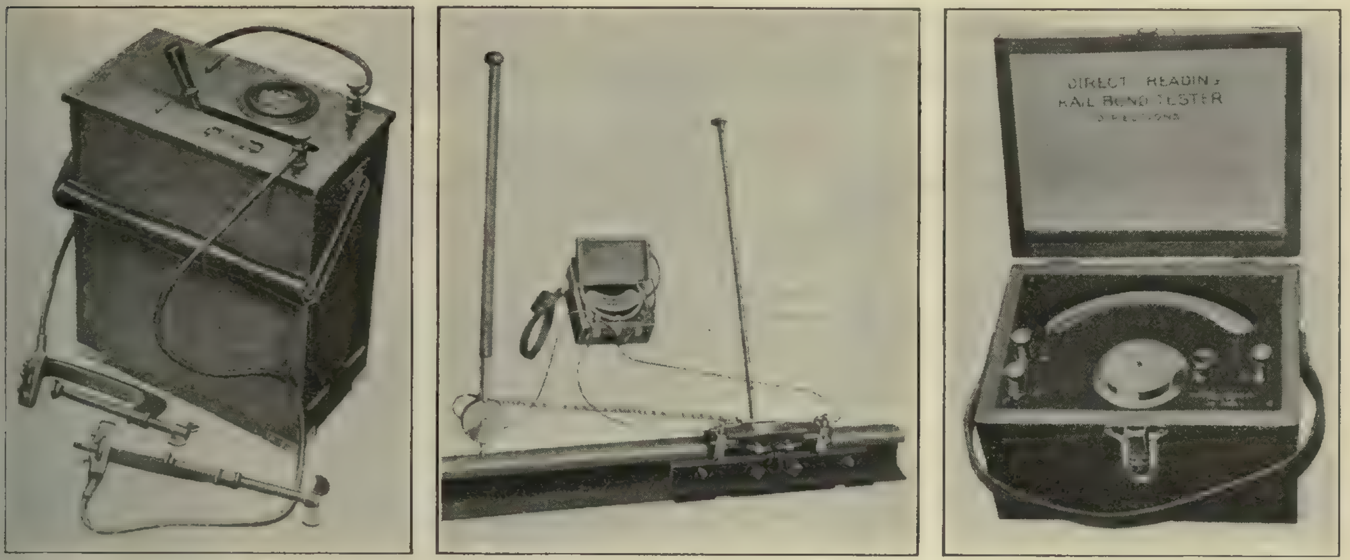
An accompanying illustration shows a light compact outfit that can be handled by one man. It consists of a telephone receiver with a headpiece, a box containing primary batteries for supplying the current for making the tests and a jointed test bar with four contact points. This contact bar is placed on the rail in such a manner that the two inside contact points bridge the joint to be tested, but do not touch the rail, all contact being made by the two end points. A sound is received in the telephone receiver unless the resistance of the joints is so high that it may be considered as "open." By putting his foot on the bar, the operator presses it down so that the two center points touch the rail firmly. Another sound is then heard in the telephone receiver. With the usual calibration the two tones will be of equal intensity, when the resistance of the joint is approximately equal to the resistance of 6 ft. of unbroken 70-lb. rail. This calibration, however, can be altered so that the point of equal sound intensity will occur at some other measure of resistance if desired. When the second tone is louder than the first the resistance of the first is higher than what is considered good practice, and the joint should be rebonded. On the other hand, if the second sound is equal to or less than the first in loudness, the joint is usually considered as being in good condition. This instrument does not measure accurately the resistance of the joint, but it gives an indication of those joints which are good and those which are poor. With this instrument joints can be tested very rapidly, especially on quiet lines where there are no outside noises to interfere with the sound produced in the telephone receiver. Another advantage of this instrument is that the sounds are made by the current in the battery carried in the box with the instrument and are, therefore, not dependent upon the current in the rail. The instrument can thus be used at any time, regardless of whether the line is alive or dead.

Another type of single instrument used for bond testing is constructed on the principle of the Wheatstone bridge. With this, the current used for operating the instrument is that flowing in the track rails, and the contact bar consists of a single bar with three contacts made from pieces of hacksaw blades. This type of contact is more satisfactory than that of a single point or chisel, which is sometimes employed, as the surface skin of the rail head is a rather poor conductor and requires sharp points to pierce it and make sure of good contact. Three types of contact are employed where hacksaw blades are used. One type has the blade arranged to form an upstanding V. This is used in the grooves of girder rails. One type has an inverted V for use on the heads of T-rails and the third is a flat type for use on either girder or T-rails.

HOW THE TEST IS MADE

This type of instrument is arranged to be hung around the neck of the operator by a strap, while the cover drops down between the operator's body and the box to assist in steadying it. To make the test, the operator places his foot on the contact bar, gives it a little motion to insure good contact, and adjusts the resistance in the two arms of the bridge by turning a knob in the center of the face of the instrument. The two other arms of the bridge are formed by the unbroken rail and the bridge across the joints to be measured. The turning of the knob not only adjusts the resistance of the two arms, but also moves a pointer around the scale of the instrument. When a balance is obtained so that the galvanometer needle is at zero, the pointer shows the number of feet of unbroken rail, whose resistance is equal to the resistance across the joint. When the current in the rail is small, it is often difficult to determine when an accurate balance is obtained. For use under such conditions, a push-button

PORTABLE BOND TESTER IN USE



AT LEFT, PORTABLE STORAGE BATTERY EQUIPMENT FOR USE WITH BOND TESTER; CENTER, INSTRUMENT WITH SELF-WINDING TAPE AND MILLIVOLTMETER; AT RIGHT, DIRECT READING RAIL BOND TESTER

switch is provided on the case, which can be opened and closed. The static kick thus produced will cause the needle to move if the arms are not well balanced. One company which makes use of this type of instrument has a portable resistance such as is used with arc welders connected between the trolley wire and the rail farther away from the trolley station than the joint tested. The use of this resistance insures sufficient current for obtaining a reliable balance. As this type of bond tester is actuated by the current in the rail, it cannot be used when the line is dead, unless current for testing is supplied from some auxiliary source. A storage battery is sometimes used. This is either mounted on a small hand car or else carried in a box by an assistant. The manufacturers of this type of bond tester supply a storage battery of 187½-amp.-hr. capacity inclosed in a wooden box, on which are mounted a switch, an ammeter and a rheostat, together with terminals for attaching the necessary leads. This case is 12 in. by 7 in. by 15 in., and the complete outfit weighs 45 lb.

When the battery is used to supply current, the box containing the battery is placed on the ground near the joint to be tested. A connection is made to the rail by means of C clamps, two of these being placed on the rail at opposite sides of the joint and far enough apart to permit the putting of the contact bar between them when in position for testing.

Another type of bond tester which makes use of a contact bar has three contacts, like the one just described. Two of these contacts, however, are made from files and the third is made by a rod, which is pressed down on the rail by the hand of the man operating the instrument. This type of instrument does not require the adjustment of resistance and the resistance of the joints in terms of the equivalent number of feet of unbroken rail is read directly from the scale of the instrument.

DIFFERENTIAL MILLIVOLTMETER ALSO USED

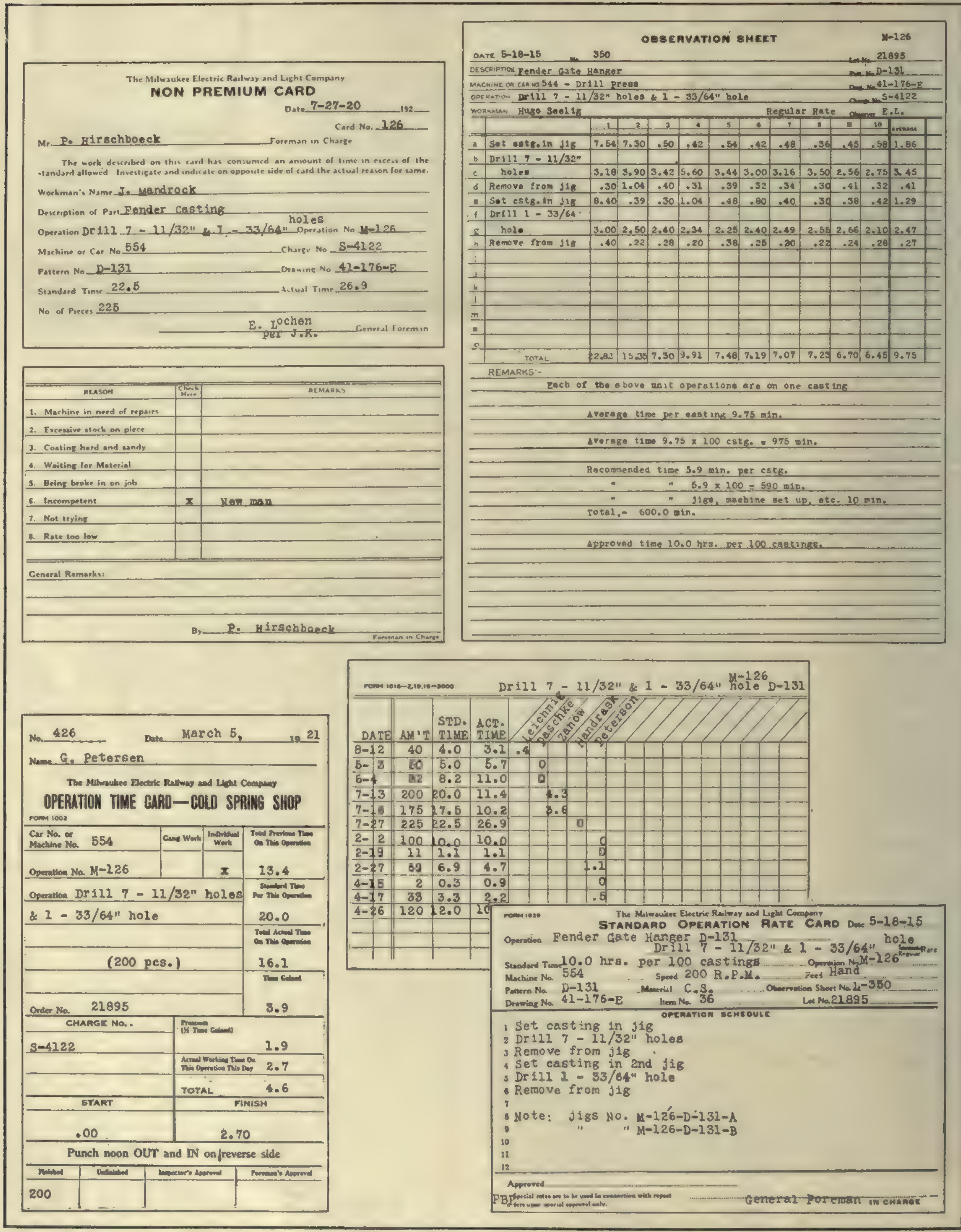
Another type of bond testing instrument consists of a differential millivoltmeter in which the opposing forces are supplied by the current in the rail, which causes one voltage drop across the joint, and another between variable points on the uncut rail. A fixed contact bar is used, consisting of two points 12 in. apart, which are clamped to the head of the rail, one of the points thus being on each side of the rail joint. Leads run from these two points to the terminals of the voltmeter, and in the tests the drop between the two points is balanced by varying the resistance on the other side of the circuit. This is not done by means of the resistance contained within the instrument case, but by moving a third contact along the uncut rail. This contact consists of a chisel point on the end of a wooden rod. Between the chisel point and the fixed contact of unbroken rail is a steel tape which shows the exact distance between the contacts. Therefore, while this instrument reads directly the resistance of the rail joint in terms of the equivalent length of unbroken rail, this length is read from a tape and not from the scale of the instrument.

Fine Record for Car Wearing Parts

THE Madison (Wis.) Railway has been particularly pleased with the service obtained from the fine new cars which were placed in service in December, 1916. These semi-steel cars, Nos. 65, 66, 67, 68 and 69, ran varying distances, from 165,000 to 200,000 miles, between December, 1916, and December, 1920, without ever coming into the shop except for ordinary inspection. During this four-year period the gears and pinions, motor and axle bearings, and armatures were not touched, except for the nightly inspection and brush renewals. In December, 1920, the armatures were taken out, turned and reslotted and put back in service, in some instances with new pinions, and in other cases there was enough remaining life so that it paid to put the old pinion back in service. At this time most of the armature and axle bearings were renewed.

The cars were originally equipped with 34-in. steel wheels which ran until June, 1920, the mileage records showing from 140,000 to 150,000 miles. Wheels are inspected once in two weeks on this property, and if one wheel appears to be wearing more than its mate, a wheel-truing brakeshoe is put on the other wheel and it is ground down until of the proper diameter. These cars are equipped with Brill 21-E trucks with hand brakes and GE-247-D ventilated interpole motors. The cars weigh 23,600 lb. and are of the single-truck, rear-entrance and front-exit type.

Forms for Premium System in Milwaukee Shops



The Milwaukee Electric Railway and Light Company
NON PREMIUM CARD

Date 7-27-20 192

Card No. 126

Mr. P. Hirschboeck Foreman in Charge

The work described on this card has consumed an amount of time in excess of the standard allowed. Investigate and indicate on opposite side of card the actual reason for same.

Workman's Name J. Mandrock
Description of Part Fender Casting
Operation Drill 7 - 11/32" & 1 - 33/64" holes Operation No M-126
Machine or Car No 554 Charge No S-4122
Pattern No D-131 Drawing No 41-176-E
Standard Time 22.5 Actual Time 26.9
No of Pieces 225

E. Lochen per J.K. General Foreman

REASON	Check Here	REMARKS
1. Machine in need of repairs		
2. Excessive stock on piece		
3. Coating hard and sandy		
4. Waiting for Material		
5. Being broke in on job		
6. Incompetent	X	New man
7. Not trying		
8. Rate too low		

General Remarks:

By P. Hirschboeck Foreman in Charge

OBSERVATION SHEET M-126

DATE 5-18-15 No. 350 Lot No. 21895
DESCRIPTION Fender Gate Hanger Pat. No. D-131
MACHINE OR CAR NO. 544 - Drill Press Dwg. No. 41-176-E
OPERATION Drill 7 - 11/32" holes & 1 - 33/64" hole Charge No. S-4122
WORKMAN Hugo Seelig Regular Rate Observer E.L.

		1	2	3	4	5	6	7	8	[illegible]	10	AVERAGE
a	Set cstg. in jig	7.54	7.30	.50	.42	.54	.42	.48	.36	.45	.58	1.86
b	Drill 7 - 11/32"											
c	holes	3.18	3.90	3.42	5.60	3.44	3.00	3.16	3.50	2.56	2.75	3.45
d	Remove from jig	.30	1.04	.40	.31	.39	.32	.34	.30	.41	.32	.41
[illegible]	Set cstg. in jig	8.40	.39	.30	1.04	.48	.80	.40	.30	.38	.42	1.29
f	Drill 1 - 33/64"											
g	hole	3.00	2.50	2.40	2.34	2.25	2.40	2.49	2.55	2.66	2.10	2.47
h	Remove from jig	.40	.22	.28	.20	.38	.25	.20	.22	.24	.28	.27
i												
j												
k												
l												
m												
[illegible]												
o												
	TOTAL	22.82	15.35	7.30	9.91	7.48	7.19	7.07	7.23	6.70	6.45	9.75

REMARKS:-
Each of the above unit operations are on one casting
Average time per casting 9.75 min.
Average time 9.75 x 100 cstg. = 975 min.
Recommended time 5.9 min. per cstg.
" " 5.9 x 100 = 590 min.
" " jigs, machine set up, etc. 10 min.
Total,- 600.0 min.
Approved time 10.0 hrs. per 100 castings.

FORM 1016-2,10,19-2000 Drill 7 - 11/32" & 1 - 33/64" hole D-131 M-126

DATE	AM'T	STD. TIME	ACT. TIME	Leichnig	Daschke	Zanow	Handrask	Peterson
8-12	40	4.0	3.1	.4				
5-3	50	5.0	5.7		0			
6-4	82	8.2	11.0		0			
7-13	200	20.0	11.4			4.3		
7-18	175	17.5	10.2			3.6		
7-27	225	22.5	26.9				0	
2-2	100	10.0	10.0					0
2-19	11	1.1	1.1					0
2-27	69	6.9	4.7					1.1
4-15	2	0.3	0.9					0
4-17	33	3.3	2.2					.5
4-26	120	12.0	10					

No. 426 Date March 5, 1921
Name G. Petersen

The Milwaukee Electric Railway and Light Company
OPERATION TIME CARD—COLD SPRING SHOP
FORM 1002

Car No. or Machine No. 554	Gang Work	Individual Work	Total Previous Time On This Operation
Operation No. M-126		x	13.4
Operation Drill 7 - 11/32" holes			Standard Time For This Operation
& 1 - 33/64" hole			20.0
			Total Actual Time On This Operation
(200 pcs.)			16.1
			Time Gained
Order No. 21895			3.9
CHARGE No.		Premium (½ Time Gained)	
S-4122			1.9
		Actual Working Time On This Operation This Day	2.7
		TOTAL	4.6
START		FINISH	
.00		2.70	

Punch noon OUT and IN on reverse side

Finished	Unfinished	Inspector's Approval	Foreman's Approval
200			

FORM 1020 The Milwaukee Electric Railway and Light Company
STANDARD OPERATION RATE CARD Date 5-18-15

Operation Fender Gate Hanger D-131 Drill 7 - 11/32" & 1 - 33/64" hole Special Regular Rate
Standard Time 10.0 hrs. per 100 castings Operation No. M-126
Machine No. 554 Speed 200 R.P.M. Feed Hand
Pattern No. D-131 Material C.S. Observation Sheet No. L-350
Drawing No. 41-176-E Item No. 36 Lot No. 21895

OPERATION SCHEDULE
1 Set casting in jig
2 Drill 7 - 11/32" holes
3 Remove from jig
4 Set casting in 2nd jig
5 Drill 1 - 33/64" hole
6 Remove from jig
7
8 Note: jigs No. M-126-D-131-A
9 " " M-126-D-131-B
10
11
12

Approved

FBP Special rates are to be used in connection with repeat orders upon special approval only.

General Foreman IN CHARGE

Top left, front and back of the non-premium card used in checking up when time taken is longer than standard.

Bottom left, operation time card on which workmen record starting and finishing time on the one job.

Top right, observation sheet used in determining standard time and method, filled in for an actual case.

Center right, accumulative performance record for each job, showing comparison between different workmen and varying efficiency of the same man.

Bottom right, standard operation rate card from which workmen get instructions for doing job and standard time allowance.

Premium Wage Plan in Milwaukee Shops

Résumé of Six Years' Experience with Bonus Pay for Standardized Jobs—The System Is Now Applied to 50 per Cent of the Total Time Worked—It Means Better Pay to the Workmen and Lower Maintenance Costs to the Company

BY J. H. LUCAS
Superintendent of Rolling Stock the Milwaukee (Wis.)
Electric Railway & Light Company

SUBSTANTIAL extra pay for industrious and efficient workmen, a saving to the company of some 25 per cent on the payroll, a more expeditious handling of work in the shops with consequent smaller organization and an invaluable accumulation of recorded information on detail car maintenance work are among the more important of many advantages accruing from the extensive use of a premium or bonus system of paying shop employees in Milwaukee. It has proved to be so eminently successful after six years of experience that neither company nor employees would consider a return to the old flat pay plan which was displaced. This premium system of wage payment was first initiated in the rolling stock department of the Milwaukee Electric Railway & Light Company in 1912, in connection with the washing of cars at carhouses, and it was tentatively experimented with on different classes of work during this and the following year. In 1914 it was definitely decided to extend the plan to the company's main repair shops. The plan was well started some time before the writer became associated with the organization and all credit for the pioneering work belongs to my predecessors and to many of the loyal workers of all ranks, who have supported the movement and who are now, if not at first, its most enthusiastic champions.

Beginning with a few men and some of the more simple and easily standardized pieces of work, the application of the premium system has been extended by steps from the paint shop to the armature room and to the forge shop, machine shop and carpenter, pattern and foundry departments, in order, and lastly to the motor and truck repair division. It has been tried out and found adaptable to practically all phases of the great variety of work handled by a street railway shop, including the running maintenance, repairs and renewals and new manufacture and construction. We have covered all classes of operations, from the painting of cars, the manufacture of car and small machine parts, the construction and installation of new equipment, changing wheels and motors, rewinding armatures and even to the repairing of wrecked cars. It will be noted from the accompanying curves that at the present time 76 per cent of the working force is engaged part of the time on premium work and that nearly 50 per cent of all the man-hours time in the shops is for work done against standard time allowances and in a standard manner. The figures taken into account in computing the percentage of working forces and hours worked on the premium system are total figures which include the supervisory time as well as the time of the productive workers. Considering this, it can be seen that the premium system is a major and very important factor in our shop operation. It is so large a factor that we should be able readily to determine that the plan is a detrimental one or a very good one; that is, it either costs us money or it saves money. We shall endeavor to show that the latter is the case. For in the last analysis, the important question that the practical man wants to have answered is, "Does it pay?"

A GENERAL OUTLINE OF THE SYSTEM

The premium system employed in our shops consists, first, in making a detailed time and method study for each job, to determine the standard method and the time required to do a certain piece of work. A stop watch is used for this purpose in most cases. A typical time study of a machine shop drill press operation is shown with the reproduction of the "observation sheet" herewith. The number of observations made (ten in this case) varies with the importance of the work. Our experience has shown that great care must be exercised and close scrutiny given in making the time study and before determining upon the standard unit of time or before issuing the "standard operation rate card" (Form 1,029 reproduced herewith) for regular use in the shop. In the machine shop, for example, it is necessary to take into consideration the type of machine to be used. speed, feed, material, quantity on the particular order, etc. We have found that special care in establishing a standard rate is well repaid, for it enables us to adhere rigidly to the rule that, once established, a rate is never changed except as made necessary by improved methods or improved machinery for doing the work. In other words, a workman can proceed to develop his maximum capacity without fear that he will be penalized by a reduction of the standard time if he makes good premium earnings. This rate cutting has been one of the chief objections raised by workers to the premium and piecework systems in general in the past, and the reason for rate cutting lies primarily in insufficient consideration of all the production factors at the time the rate is determined. The details of the method, men, machines and means of doing a piece of work should be thoroughly studied, regardless of the time required to do this, and the standard can then be set close enough so that the company can afford to give the worker his share of the results of his ability and skill in bettering the time. When experience assures the men of a "square deal" they gain confidence in the plan, and this makes for a better measure of co-operation than is commonly found.

The men who make the time studies and determine the methods to be followed become very expert and command a good rate of pay and are worth it. Even such jobs as repairing wrecked cars, which at first thought would not seem to lend themselves to standardization or an accurate estimate of the amount of labor which should be required, are now often handled on a premium basis in our shops, for analysis has determined that most of our damaged cars come within one of several classes of wrecks, either a one-post, two-post or three-post wreck, etc. The time-study man observes the extent of the wreck, carefully examines the car-body members to be replaced and, from past experience and study, is able to estimate with remarkable precision the amount of time that will be involved in making the repair. The workmen who are then given this job note the time allowed and immediately set out to beat that allowance, and they use their heads and conserve their time, for it means money to them to do so.

Any man working on a standard job is given one-half the time saved in completing the standardized operation. That is, where a man does a ten-hour job in eight hours he receives one hour additional pay, or pay for nine hours for eight hours' work. The division of the savings on a "fifty-fifty" basis between the man and the company is considered fair and equitable by both parties. The company's saving is partially used, it is understood, to defray the expense of employing time-study men and of providing the necessary standards and clerical help, in order to give the workman the opportunity to increase his day-rate earnings.

In the operation of a system like this the use of the unit system of timekeeping is a necessity. Instead of assigning daily time cards to employees the time of each man spent on each job during the day is recorded on an "operation time card" (Form 1,002 reproduced herewith).

Under the old system of timekeeping still used in many places, a time card is given to the workman on which to record at the end of the day, according to his best remembrance, each job he has done during the day and the time it took him to do it. In most cases, he is expected also to enter the charge account number for the various jobs which he worked on. The disadvantages of this system, of course, are very apparent. It takes the man away from productive work, requiring at least fifteen to thirty minutes of his time to do "figuring" at which he usually is not adept. Jobs which do not take very much time are slighted in his record, because he does not want to go into any more detail than he has to. In some cases, a special timekeeper or checker has the duty of checking the work record with the man and his foreman and the assignment of the charge. But in neither case is the record returned anywhere nearly as accurate as with the unit job system, which we use in our premium system.

With this plan, the time card being worked on specifies one item of work. When the man changes his job, he also changes his time card. With the unit job system, the foreman determines in advance what the man's next job is to be, instructing his clerk to make out a time card showing the charge, standard operation number, the man's name, etc., and this card is placed in a rack, located adjacent to the departmental time clock, where the workman obtains it when he is ready to start work on the next job. The card on which a man is working is always turned in at night and a new card issued in the morning, as the card is a daily record only. As he takes a new card he punches the time recorder clock, which records in a decimal system the time at which work is begun on the particular job. When that job is completed he punches "out," thus printing in the time of completing the job, and at the same time he punches the new slip "in," which records the time at which he starts work on the new job to which that card assigns him, there being no loss of time between operation The workman is not intrusted with any duties in con nection with the timekeeping or record work other tha merely punching the clock.

A "performance record" (Form 1,018 reproduce herewith), which is maintained in the main office o the shop, is of great value in checking up on the progres made over a long period of time. When an individua does the same job several times it is assumed that hi efficiency should improve and that the time require to do the work will be reduced. This is not always th case, however, and variations from this natural ten dency are followed up to determine the cause.

This performance record also makes possible a com parison of various men in doing the same piece of work We have found cases where the time taken to do certain piece of work, over a period of months, wa remarkably similar, as far as it concerned a certai group of men, and that when this job was given to som one outside of the "ring" a considerably better recor was made. The group in question had succeeded i deceiving the foreman to the extent that he though they were doing very well, and, inasmuch as they wer keeping within the standard, special attention had no been called to what was evidently an effort to control th amount of earnings on the job in question. This con niving would have some effect on the gross earning made by the men, which would then be used as an argu ment for an increased day rate. A little "shake-up" a a result of this investigation and the assignment of ne men to the job results in some saving in the net cost o doing the work.

It happens now and then that the time consumed i a given job is in excess of the standard time. When record of this kind comes through, a "non-premiun card" (Form 1,036 reproduced herewith) is made ou by the timekeeper and sent to the general foreman' office, from which an investigation is started to deter mine why more time was taken than should reasonabl be allowed. The "stock" reasons printed on the bac of the form reproduced and shown in the reproductio are those used in connection with the work of th machine shop, and they differ, of course, for the othe shops. This checking up on the reasons for exceedin the standard time, we find, has a decidedly good effec on the men in general.

Function of the Foreman

In our method of applying the premium system, th foreman has been made an important functionary. W have arranged a bonus plan so that he profits from th extension of the system. It is to his advantage, in this way, to co-operate to the fullest extent in furtherin the establishment of standard rates and seeing to it that they are used after being established. All our foremen now like the premium system, though some did not like it at first.

The foremen have found, however, especially during the last few years, that this system is a great help to them, as it lightens their burdens of detailed supervision and thus enables them to give more time to the broader aspects of their jobs, such as planning of the work, devising improved methods, etc., in which they develop as leaders rather than drivers of men. The premium system supplies the incentive to reward and the check-up for failure that keeps the man on the job without some one standing over him.

The premium rates are arranged for, in the first place, largely on the authority of the foreman in the department. He has a time-study man assigned to work with him, and since his earnings from the bonus system depend on the percentage of net working time that is worked on premium in his individual department, he is nterested in pointing out to the time-study man any new possibilities of jobs to be standardized. He is herefore also interested in approving these standards as correct after the time-study man has completed his work and in passing them on to the general foreman for approval.

From this procedure the responsibility for the proper operation of the rate after it is standardized rests in great measure with the foreman, and we find that we now get rates that are remarkably accurate and standards that are fair in their returns to both men and the company. Under this bonus plan the foreman does not profit from any excess earnings that the men may make, and as the performance records are subject to scrutiny he foremen give a good deal of care and attention to he rates before they recommend them as standard.

The foreman soon finds that the system is of assistance to him because the standard rate-card file is much more dependable than his memory as to methods of doing a job, or his pocket notebook if he kept one. Most of our foremen now use the records extensively in assigning work. If his assistant quits the foreman has an easier time in breaking in a new man. All he has to do is to hand him the standard job card on any particular piece of work and say: "This is the way to do it and this is the time it should take, if done right." The assistance afforded by these records is not as greatly needed for the day-to-day recurrent jobs and with a steady, competent gang of workmen as it is for the nfrequent and varying jobs, such as wrecks, for example, which are rarely twice alike in the same week, but which do occur in almost exactly similar detail several times in a season. Even with this infrequent kind of ob, as I mentioned before, if a regular crew were on the ob, there would be no need to depend on the cards and records. But the effect of labor unrest (in many cases t seems like "labor rest") and the changing help from day to day has been generally felt, I am sure. The most trusted workmen were called to the colors, and the struggle to keep things going right and to hold to standards of maintenance with many new and frequently ncompetent workmen seemed hopeless indeed. That was a time when the detailed records of jobs already standardized came in mighty handy. The card gave the gang leader or the machinist his instructions in definite form. Instead of telling the boy (or girl) we had to put on the job to drill fender gate hangers, we handed him (or her) a card showing exactly what was to be done and in what sequence. (See cut of standard operation card.) Here were clear, concise instructions which the new employee could carry out with the minimum amount of coaching from his foreman. This also applied, of course, to the old, experienced hands. As the time which the job should take appeared on the card, the employee could tell whether or not he was producing work economically, and the incentive of extra pay was there to urge him to do his best.

Good Workmen Like the Premium System

Our men like and appreciate the premium system because it is of mutual profit to the company and to them. It gives them an opportunity to work under better conditions, for they are better satisfied to receive recognition for the actual labor they perform than to be without identity, as under the former system of flat day rates of pay. By making a man responsible for the performance of a definite task and setting a standard of attainment for him, his love of achievement, his desire for the good opinion of his superiors and his fellow workers and his personal interest all impel him to meet the standard and better it. The instinct of competition with fellow workers is usually very strong, and the friendly rivalry which is plainly in evidence is a powerful spur to accomplishment. A good man likes to beat the record of the other fellow, and incidentally it means money in his pocket to do so. The responsibility is a steadying and good moral influence, contributing to self-development. Promotion and wage increases are based on performance records, and they afford further recognition for merit and accomplishment.

The study that has been given to individual jobs has also resulted in the remedying of inefficient shop conditions and has served to increase the general plant efficiency. More attention is being given to planning and scheduling of work through the shop. Materials are delivered to machines and work places in advance of the time they are needed, and instead of having high-priced mechanics running all over the shop to secure some little bolt or screw, this is done for them more expeditiously and at lower cost by some lower-priced laborer. Thus undisturbed in his job, the workman is enabled to devote his entire energies to production, and by increasing his production to find additional money compensation.

What Does It Profit the Company?

Getting back to the question originally raised of whether it is all a pretty theory or a real profit to the company, the answer is best found by referring to our individual records of jobs. The example shown on the forms reproduced with this article, which is typical of practically every operation standardized, shows a net reduction of productive shop labor cost, after the job was placed on premium as compared to the records of cost before the job was standardized. Referring to the observation sheet reproduced, it is seen that the average time taken to drill fender gate hanger castings previous to setting the standard time was 9.75 minutes per casting for the ten observations. The standard set as 6.0 minutes per casting was a reduction of about 40 per cent, and yet, as the operation time card shows, this standard time has been equaled or bettered eight times out of twelve jobs. The most serious failure is explained on the back of the non-premium card as "incompetent, new man," and even in this case the time taken by the workman was not as much as the average time required before standardization.

We are certain that 33⅓ per cent is a conservative figure for the average saving in time for standardized work over unstandardized. And since approximately one-half of the working time of the shop is on the premium plan, the net reduction in the payroll from this source is seen to be 16⅔ per cent. To be added to this is a saving equal to 10 per cent of the total payroll hours, which is obtained from the company's one-half share of the time saved by workmen earning premiums. This brings the total profit to the company up to more than 25 per cent of what the payroll would be without the premium system. This "income" or "saving" or "credit entry," or whatever one may wish to call it, is not affected by fluctuations in the rate of wages, as is the case with piecework and similar systems, for this plan is based on time units which do not vary, rather than on monetary values. This saving of one-fourth in the payroll or number of labor hours used for the output of the shops is really too low a figure to represent the returns to the company, when the productiveness of the average worker on flat pay basis in the immediate past is taken into account. I do not hesitate to express the opinion that our shop force and payroll would have had to be one-third to one-half larger in number and cost during the past year had we been operating under the flat day-rate wage system.

There are other accruing advantages to the company. On Dec. 31, 1920, we had 5,471 regular standard operations for repetitive jobs and 3,832 special standard operations for non-recurrent special jobs, approximately 10,000 carefully constructed records of labor performance effective and in use in our shops. This quantity of valuable data is being used and augmented daily and we would hesitate to place a monetary value on it. It is an asset to the organization that perhaps does not appear on the balance sheet, but is nevertheless the result of six years of planned, attained and recorded progress which we feel is of immense value, about correctly appraised in the words of some one who said: "Five years of this . . . will accomplish more than twenty years of rule-of-thumb information locked under the hats of shifting employees."

STANDARDS BEING SET FOR EVERY JOB

Due to the extreme care which it was necessary to exercise in the observations preparatory to the establishment of the standard time for various operations, the extension of the premium system, particularly at first, was a gradual and slow procedure. This is well illustrated in the chart referred to early in this article, showing the growth of the system since 1914. As every one in the organization has become more and more familiar with the details of the plan and the time-study men have become more skilled, the expansion of the system to new work has been more rapid, until now we are reaching standards for the very intricate and infrequent jobs. It should be mentioned also that there are many corollary savings to the company, resulting from expediting the movement of work through the shops, the more exact costs returned, the checking up on odds and ends of the work, etc. These are small matters in themselves, but in the aggregate they make entries on the credit side of the ledger of considerable importance, for "a penny saved is twopence earned."

Head time-study man	1
Time-study men in various departments	5
Chief inspector	1
Inspectors in various departments	6
Stenographer	1
File clerk	1
Total	15

Against the credits to the premium system noted in the past few paragraphs must be charged the expense incurred for the larger supervisory, office and inspection forces required. The number of employees used in these capacities for the operation of our premium system, with a shop force averaging between 500 and 600 men, is approximately shown in table above.

I question whether the time of the inspectors should be charged against the operation of the premium system. But there has been so much criticism directed agai the various incentive methods for increasing productio because it is alleged that they reduce the quality of t work and increase the number of equipment failur etc., that we have debited the premium system with t cost of the inspection department. Some would co sider it necessary in any event. The net result is increase of 2.5 to 3 per cent in the payroll to offset t 25 per cent decrease explained above.

There is no question in our minds but that the p mium system does pay.

System Prevents Mistakes

The Numbering and Lettering of Axles, Gears and Pinic Makes Easy the Distinguishing of One from Anothe and Is of Great Assistance in Keeping Stock . and Service Records

BY C. R. MCMAHON

Master Mechanic Des Moines (Iowa) City Railway

SOME difficulty is experienced in electric railway sho especially by new men, in being able to distingui the different types of axles, gears and pinions. T different types may sometimes look almost alike, ev to having the same number of teeth in a gear or pini for example. To alleviate this situation, the writer h installed the following system of numbering these pie of equipment and it has been found to work out ve satisfactorily.

Each of our different classes of motors has b assigned a letter, such as A, B, C, etc. All axles, ge and pinions are stamped with the corresponding let and, in addition, a number. For example, the first a for use with G. E. 57 motors is marked 1-A, the gear marked 1-A and the pinion 1-A. The next one of e would be marked 2-A, etc. For the next type of mot the axle is marked 1-B, gear 1-B and pinion 1-B, the next one of each of the same type would be 2-B, Two axles for different type motors may thus have same number but a different letter, and the same syst exists with gears and pinions. If an axle, gear pinion is removed from a car, it is only necessary the shop man to replace it with a new one having same letter, and it is sure to be right. This system lettering and numbering is also a great help in keeping of stock and service records.

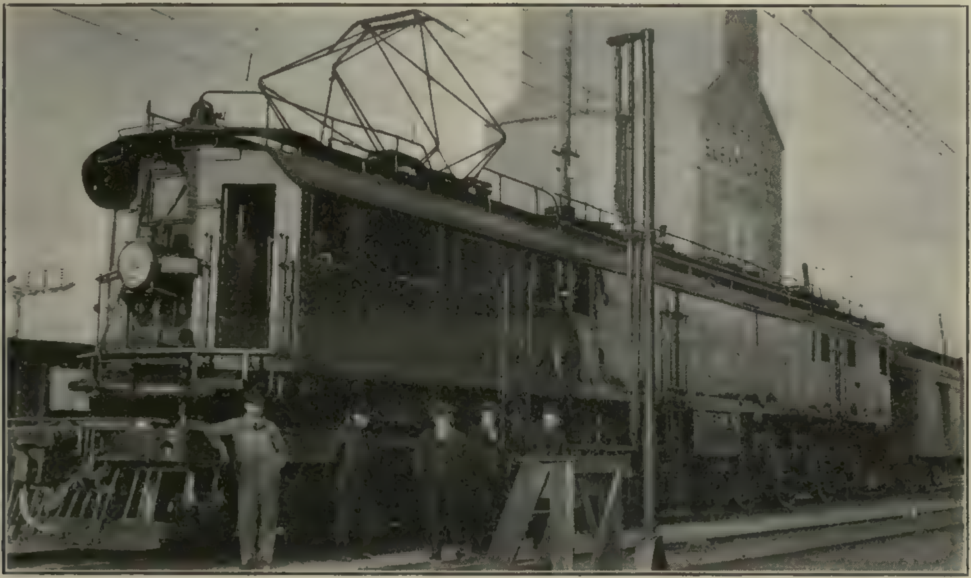
Axles are numbered on both ends by stamping. gears are numbered either by soldering a brass pl on the web or by placing a piece of galvanized sh iron around a spoke and fastening it with a rivet. number is then stamped on the brass plate or sheet iron strip.

RECLAIMING ARMATURE BEARING HOUSINGS

The armature bearing housings of solid frame mot frequently become worn so that they fit loosely in motor housings. This condition may be readily ov come when a bearing is in for rebabbitting by forc a steel pin through the bearing in a manner to exp it. This pin should be made just large enough expand the bearing the proper amount to fit the p ticular housing, which means that it is necessary have a different pin for each size of bearing. The should be made somewhat in the shape of a cartrid It is not advisable to try to expand bearings to take an extremely worn condition, for there is danger cracking them.

Shop Notes from Deer Lodge

hicago, Milwaukee & St. Paul Railway Shops at Deer Lodge, Mont., Maintain the Locomotives on the Rocky Mountain and Missoula Divisions—The Routine Procedure and Some Special Problems Are Covered in This Article—Practical Studies Under Way Continually for the Elimination of Weaknesses that Develop in Equipment



LOCOMOTIVE AT HEAD OF PASSENGER TRAIN ON THE MILWAUKEE

THE electric locomotives for the Missoula and Rocky Mountain divisions of the Chicago, Milwaukee & St. Paul Railway are maintained in the epair shops at Deer Lodge. The two divisions stretch rom Harlowton on the east to Avery on the west, Deer odge being at the mid-point. At Deer Lodge are xtensive shops, formerly used in steam locomotive aintenance, and here the division master mechanic, . Sears, is located.

On the two divisions which join at Deer Lodge there re employed in freight service thirty-two General Elecric locomotives of the type described in the issues of his paper for June 5, 1916, page 1072, and Oct. 21, 916, page 888, and in passenger service ten Westingouse locomotives of the type covered in articles in the ssues for March 23, 1918, page 559, and March 13, 920, page 510.

The passenger engines are operated through the ntire 440 miles as a regular thing and the freight ocomotives are similarly scheduled in some cases. This act is mentioned by way of contrast with steam locomoive practice, which required the changing of locomoives on entering each 110-mile steam division of the ailway.

CONSTANT INSPECTION KEEPS DOWN MAINTENANCE COSTS

The general method of looking after the locomotives s as given below. Special stress is put upon the inteligent upkeep of the equipment, involving a practical nowledge by operators and inspectors of the principles f the apparatus in their charge. To this end copies f a handbook of rules and regulations for the government of enginemen and inspectors are furnished to all f these men. This furnishes the answers to pracically all questions apt to come up and contains an extensive set of questions by which the knowledge of the men can be gaged.

As to inspections, after every trip made by the locomotives there is a casual inspection requiring the services of a man and a helper for from one and one-half to two hours. Every six days the freight engines are ordered in on account of oiling, bringing into the shops seven or eight per day.

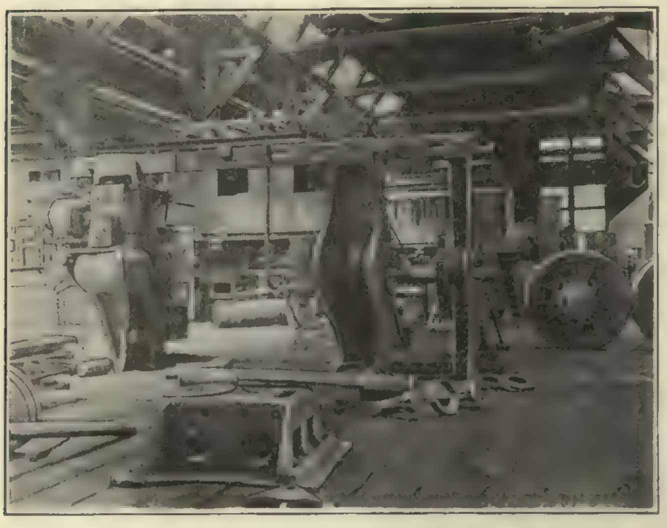
Passenger motors are inspected at the end of each trip like the freight machines. Oil gaging is done at the terminals, but all packing is done at the shops. Bearings are repacked every three months.

Every 3,500 to 4,500 miles the locomotives are given a thorough, daytime inspection, requiring the following force of men: One for the traction motors and pantagraphs, one for the testing and setting of relays and two for work on controllers, interlocks and other operating devices in the cab.

FLANGE WEAR DETERMINES WHEEL LIFE

In addition to the above there is a wheel inspection every week. The hardest wear on the locomotives comes on the wheel flanges and the main journal bearing liners; hence special attention is concentrated on flange and lateral wear. In checking flange wear a square steel gage, suitably notched on the four sides, is used, giving four regular flange contours. As thin flanges ultimately determine the scrapping point of the wheels they are watched with great care, and the wheel rims are turned until they reach a thickness of $1\frac{11}{16}$ in. for the General Electric and $1\frac{7}{8}$ in. for the Westinghouse locomotives. There is yet $\frac{1}{4}$ in. to go in these cases before the tire is said to be worn out.

The general foreman turns in each week a report for each locomotive examined showing the condition of the flange of each wheel by gage number (1, 2, 3 or 4).



SHOP VIEW AT DEER LODGE—BIG WHEEL PRESS IN FOREGROUND

LOCOMOTIVE CAB RAISED FROM TRUCK FOR TRUCK OVERHAUL

Lateral clearance for each main journal is also reported, as well as the clearance between the motor brushholders and the risers of the commutator.

A weekly report is also made of tires turned, by locomotive and wheel numbers, and of lateral wear taken up. An inspection of the records for a week just previous to the writer's visit to the shops showed the larger part of the flanges to be coming within the range of No. 3 gage, the lateral clearance to be running from 1 in. to 1½ in. and brushholder clearance about $\frac{1}{16}$ in.

During a similar week forty-four flange defects were corrected and twenty-four cases of excessive lateral wear were cared for.

After the close of the railroad's fiscal year, ending with June, the mechanical department makes up a detail record of the cost of maintenance of all parts of the locomotive in detail. The report covers labor and materials for the following items: Pantagraphs, motors, control, lights, motor-generator sets, heaters, fuses, motor brushes, miscellaneous brushes, locomotive body, trucks and wheels, air brakes, compressor, flange oilers, sanders, brakeshoes, draft gear, speed recorders, headlights, oiling, regeneration, heating boilers, testing, supervision, painting, meters, lightning arresters, gear grease, gears and pinions.

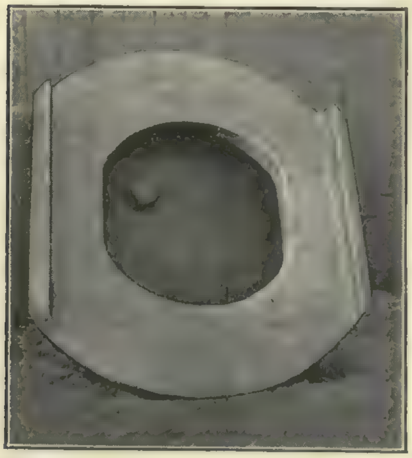
At Deer Lodge, as in all railway shops, there are practical studies under way continually for the elimination of weaknesses that have developed in equipment or for the improvement in practices for the sake of operati
economy.

One of these is in connection with the bearing line
which limit lateral play of the motors on the axl
The liner is carried on the inside end of the journal bo
It consists of a cast-iron washer faced with a bra
or fiber plate. To prevent turning of these liners th
are now being cast with two parallel lugs which proje
over the journal box. Photographs are reproduced he
with to show this construction.

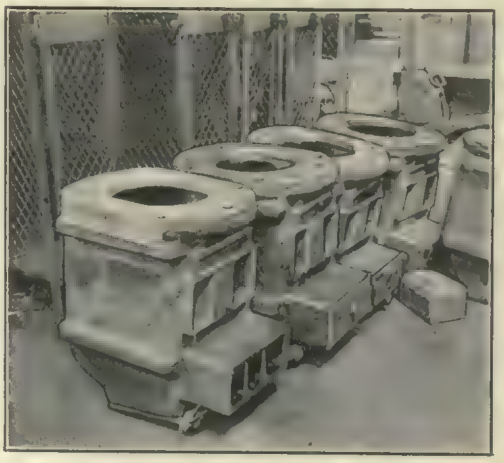
Excellent results are being secured with the type
motor bearing shown in still another illustration. Th
is a cast-iron bearing made of "Hunt-Spiller" met
with spiral grooves, ¼ in. deep, filled with babbitt. T
babbitt used is 4X nickel babbitt. These bearings ha
made as high a mileage as 60,000.

In "spotting" locomotives about the roundhouse 22
volt current is used with the earlier locomotives, t
circuit being plugged in on the ground side of the co
troller to two motors. The machine is then operat
from a stationary controller. On the new locomotiv
provision is made for putting the spotting current
all of the motors through the regular controller
means of a single-pole double-throw switch provided f
the purpose.

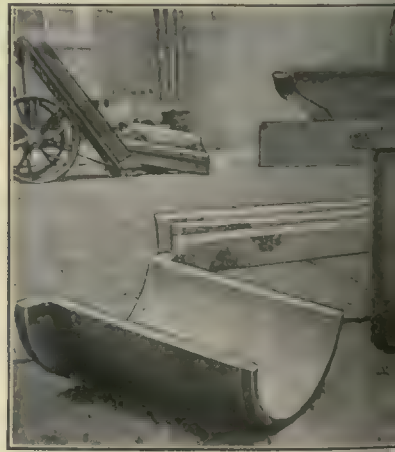
Realizing the importance of extreme care in the ha
dling of the high-voltage equipment on the electric loc
motives, the railroad has issued strict instructio



NEW FORM OF BEARING LINER WITH LUGS TO PREVENT TURNING



JOURNAL BOXES WITH NEW WEARING PLATES IN POSITION



BEARING OF HIGH GRADE IRON WIT
BABBITT-LINED SPIRAL GROOVES

regarding safety precautions. The following quotations are taken from the rule book and illustrate this point:

CAUTION

No repair work or corrections shall be attempted, except by those duly authorized, who will first see that all switches controlling the circuit on which work is to be done are open. Before undertaking any work in connection with the electrical apparatus or wiring, they should ascertain just what is to be done in order to do it with as little delay as possible, and at the same time use care for protection of themselves and others.

When repairs are made on the road, all high voltage wiring and electrical apparatus must be treated the same as though it were energized even though the collectors are down, until the man in charge has been notified that work is to be done on it. Ropes are provided for holding the pantagraphs down and both pantagraphs and trolley pole should always be tied down when work is to be done on any of them, the wiring between the pantagraphs and main switch, or lightning arrester, when the locomotive is standing under the trolley wire.

RULES GOVERNING EMPLOYEES IN OTHER THAN TRAIN SERVICE

First—Every employee whose duties are in any way connected with the operation or maintenance of the electric and air-brake equipment used on electric locomotives will be required to have a knowledge of the apparatus with respect to its operation, and safety to himself and others. He will be subject to examination covering same.

Second—Only authorized employees shall work on or about the air-brake and electric equipments.

Third—Only authorized employees shall move electric locomotives.

Fourth—Shop employees and inspectors on the road or at terminal shall not work on or about the electric apparatus on electric locomotives until after the pantagraph and trolley pole have been lowered or the trolley wire deenergized.

Fifth—In case of failure of the automatic devices on the pantagraph, and it becomes necessary to operate the pantagraph, this shall not be done until after the main and auxiliary switches are opened. The pantagraph must then be operated with the insulated pole provided for this purpose.

Sixth—Preparatory to working under a locomotive employees shall first open the main switch.

Seventh—Employees working on or about electric locomotives shall protect themselves by the use of a red flag by day and a red light by night.

Eighth—In case of accident to an employee the nearest company physician shall be immediately notified and all aid rendered in accordance with instruction chart on "First Aid to the Injured." The office of the district master mechanic must be notified immediately of all accidents.

Welding Steel Wheel Flanges Successfully

E. B. GUNN, superintendent and master mechanic, Western Ohio Railways, Wapakoneta, Ohio, has had unusually good success in building up worn steel wheel flanges by means of electric welding. During the two and one-half years that this practice has been followed 200 wheels have been welded with only three failures. From 40,000 to 50,000 miles on the average is obtained from these wheels after welding. The method followed by Mr. Gunn is somewhat different from that employed in many shops, and this may account for his greater success. His process was fully described in the ELECTRIC RAILWAY JOURNAL, issue of July 17, 1920, page 129.

Charting Conditions of Air-Brake Equipment

Description of an Air-Brake Test Using a Recording Pressure Gage to Indicate the Condition of the Equipment and Provide a Permanent Record for Future Use

BY KENNETH R. LEWIS

ONE of the things which vex an air-brake foreman most is to have a car returned for giving trouble but a short time after its equipment has been overhauled, tested and put in supposedly perfect condition. In order to insure that the equipment was in the best condition possible after being overhauled, the following air-brake test was devised to give a positive indication of the conditions of the various pieces of apparatus and to provide a permanent record to be filed for future reference.

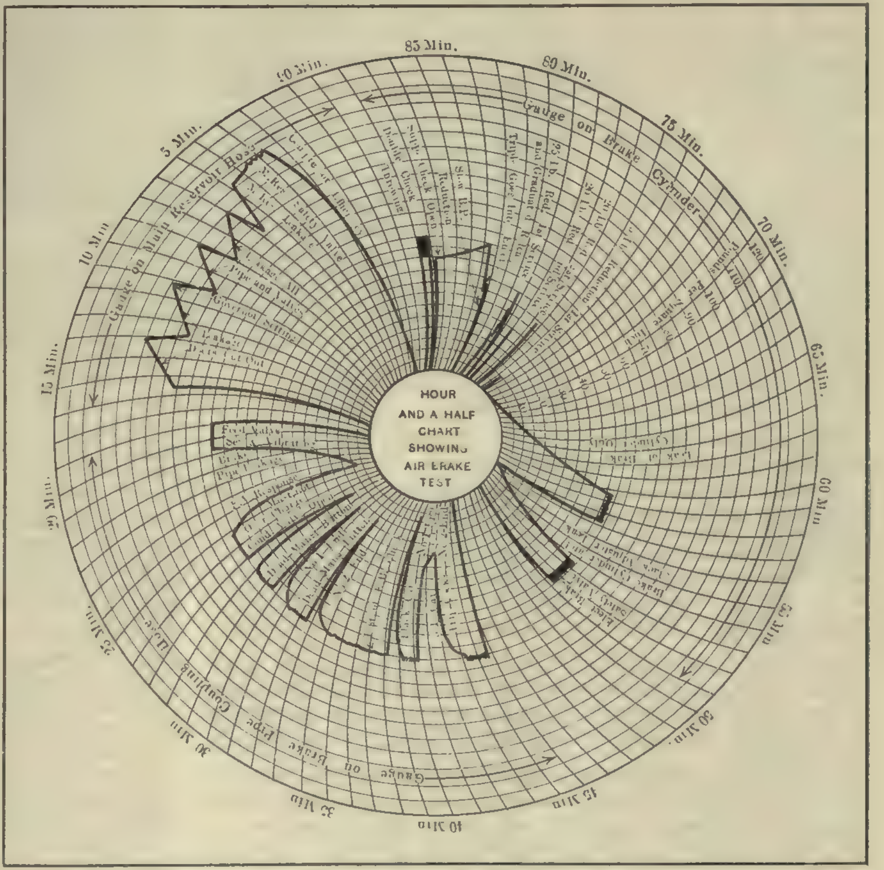


CHART OF AIR PRESSURE IN BRAKING SYSTEM DURING TEST

The apparatus used for making the test consisted of a 12-in. recording pressure gage registering up to 125 lb. per square inch and making one revolution in one and one-half, three or six hours, depending on the gearing used. The usual tests required about one hour to complete, so for these tests the slowest speed was used in order that the chart could be more easily read. Each car was tested after its equipment had been repaired and overhauled, and cars which had been in collision or in trains which had run by signals in operation were tested immediately after the occurrence and the records filed for use in case there should be a claim necessitating definite information at some later time regarding the condition of the brakes on that particular car.

Before this method of testing was inaugurated, it seemed to be a habit of motormen to claim brake failure as the easiest explanation in case of trouble on the road. After a few such cases had been tested, and the charts produced as evidence that the equipment was in satisfactory condition, these men ceased to blame the equipment and admitted that they had misjudged the stopping distance. The test also proved an excellent check upon the workmanship of the repair men in overhauling.

When this method of testing was first started, a majority of the cars tested after being overhauled were rejected for excessive leakage or improper working of the valves and required additional work to put the equipment in proper condition. When the men learned that poor workmanship could not get by, the equipment was turned out in much better shape and passed all tests without difficulty. Flat wheels and brake troubles that previously had been mysterious, and which could not be directly located in the old way of testing by applying and releasing the brakes and watching the brake cylinder, showed up immediately on the chart.

The accompanying diagram shows a sample chart that was made up as a guide for the man making the test and was used for comparing and checking other charts as they were obtained from cars under test. The following instructions for making the test were also supplied to the men:

INSTRUCTION FOR TESTING AIR BRAKE WITH RECORDING GAGE

Connect the gage to the main reservoir and place the brake handle in release position.

1. Start the test with the main reservoir empty. Close both door and control-pipe feed valves. Ground the synchronizing wire so that the governor will not operate to cut out the compressor. Cut in the compressor switch and allow the compressor to pump up pressure until the safety valve opens. The gage chart will show compressor efficiency; also the setting and operation of the safety valve from this test.

2. As the main reservoir pressure is building up, check the car gages at both ends of the car at several pressures to see that their indications correspond to the pressures indicated by the recording gage. If not, they should be properly set.

3. Remove the ground from the synchronizing wire so that the governor will cut out and stop the compressor. Then let the recording gage operate about one minute to register the main reservoir and reservoir pipe leakage and the leakage back through the compressor check valves.

4. Cut in both the door and the control feed valves, and after all piping and valves are charged up and the brakes released allow the compressor to operate normally one or two cycles. The gage chart will then indicate the governor setting and, from the time and rate of reduction of pressure after the governor cuts out, the rate of leakage of all valves and piping combined will be recorded.

5. Repeat the last test with the door feed valve cut out in order to record the leakage without door engines and piping cut in.

GAGE ON BRAKE PIPE

Remove the recording gage and tap it on the brake pipe coupling hose.

6. With the brake handle in the release position, allow the gage to register one or two minutes so that the chart can record the feed valve setting and vibration. Meanwhile check the brake-pipe hands on the car gages at both ends to see that they are properly set.

7. Make a 5-lb. brake-pipe reduction and then lap the brake valve handle. The recording gage will then indicate the rate of brake-pipe leakage. Should the pressure increase instead of decrease, this indicates a leaky brake valve.

8. When the brake pipe has been reduced to a low pressure, return the brake valve handle to the release position. The recording gage will indicate the response of the feed valve or show up any restriction in the piping. Note that pressure does not build up higher than the feed valve setting as would be caused by a binding or sticky feed-valve piston.

9. Pull the conductor's valve from the other end of the car in order to test the rope for strength. The test chart will indicate whether the reduction of brake pipe is enough to cause an emergency application of the brakes with the brake handle in release position and whether there is a restriction in the piping.

10. Operate the "dead-man's button" on the No. 1 end of the car, then after closing and when the brake pipe is again fully charged, operate the dead-man's button on the No. 2 end of the car. The gage chart will indicate that the brake-pipe reduction is heavy enough to apply the brakes in emergency with the handle in the release position on the brake valve.

11. With the brake pipe fully charged, make several heavy applications of the electro-pneumatic brake in order to record the fact that the check valve does not leak. Any reduction of brake-pipe pressure shown on the chart indicates a leaky check valve in the line ahead of the electro-pneumatic brake tap.

12. With the brake handle in the release position test out each automatic trip valve allowing time between tests for brake pipe to recharge.

GAGE ON BRAKE CYLINDER 5-IN. PISTON TRAVEL

Remove the recording gage and tap it on the brake cylinder.

13. Apply the electro-pneumatic brake until full pressure is reached and the safety valve operates long enough to record the setting pressure.

14. After a full electro-pneumatic brake application, place the brake handle on the electric lap position for two or three minutes. The gage chart will indicate the combined brake cylinder and slack adjuster leakage.

15. Release the electro-pneumatic brake and take up the slack adjuster to give a 4-in. piston travel and repeat last test. The gage chart will then indicate the brake-cylinder leakage without the slack adjuster leakage.

16. Fully release the electro-pneumatic brake, then turn the snap switch to the "off" position. Allow the gage to register for one minute in order to show the leak if any that takes place through the electro-pneumatic brake-application valve.

17. Make a 5-lb. brake pipe reduction, first service position. The gage chart will indicate whether the triple valve operates properly on slight reduction.

18. Make a 20-lb. reduction, first service position, to indicate on the gage chart that the brake cylinder pressure given is correct for this reduction. Release the brakes.

19. Make a 20-lb. reduction, second service position, to show that the triple valve does not go into the emergency position. Release the brakes.

20. Make a 25-lb. reduction, first service position, and then graduate the release, allowing time between graduations for the chart to record the pressure at each step. To pass the test, the chart should show at least three graduations of the brake cylinder pressure.

21. Place the brake-valve handle in the first service position and leave it there until the pressure is reduced to zero The gage chart will indicate length of time required for the triple to go into emergency position.

22. Leave the brakes in the emergency position severa minutes so that the gage chart will show how the brake cylinder pressure is maintained after an emergency application.

23. Move the brake-valve handle several times from electro-pneumatic to automatic position in order to show on chart the operation of the double check valve from side to side.

The above instructions, of course, apply particularly to but one class of equipment, and these would need revising for other types. However, by following through these tests and comparing with the chart, the user can make any changes necessary for other types of equipment.

Since the inauguration of this method of testing the number of defects causing detentions to service has been materially reduced.

Arc Welding and Motor Maintenance

Equipment Men of the Electric Railways of Ohio, Pennsylvania and West Virginia Gather for Semi-Annual Exchange of Experience—Considerable Doubt of Economy or Safety of Welding Wheel Flanges Develops—Motor Maintenance Talk, Illustrated with Stereopticon Slides, Given

BAKING OVEN AND TRANSFER TRUCK

THE Association of Electric Railway Men, which comprises the equipment men of the electric railways in Ohio, Pennsylvania and West Virginia, held a meeting in the offices of the Richland Public Service Company, Mansfield, Ohio, on Dec. 7, 1920. There were about forty-five in attendance, a number of whom stayed over to visit the Mansfield plants of the Ohio Brass Company and the Westinghouse Electric & Manufacturing Company on Dec. 8. A full day of informal discussion, led off by a talk on electric arc welding by A. M. Candy, Westinghouse Electric & Manufacturing Company, and illustrated with stereopticon slides, and another illustrated talk on railway motor maintenance by J. S. Dean, also of the Westinghouse company, occupied the equipment men on Tuesday. They were the guests of H. A. Cowgill, general superintendent of the Richland Public Service Company for luncheon, and of the Ohio Brass Company for dinner and a theater party Tuesday evening.

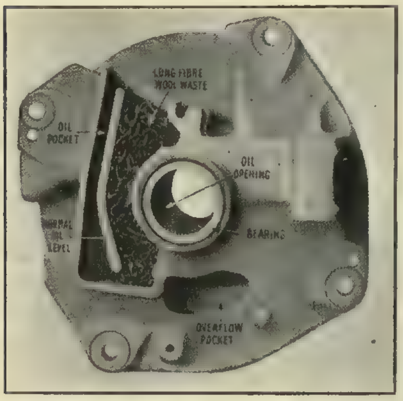
Mr. Candy's talk on arc welding occupied the entire morning session, and it proved of great interest to the master mechanics. The substance of this talk, together with many of the illustrations used, were published in the issue of the ELECTRIC RAILWAY JOURNAL for January 15, 1921. In general he endeavored to show the scope of electric welding work and explained with illustrations some of the technical aspects of the subject, such as the effect of polarity, the effect of long and short arcs, of too high current, too low current, etc., and gave a brief description of the several systems of welding and their relative efficiency.

In the discussion which followed Mr. Candy's talk I. E. Church, Pittsburgh (Pa.) Railways, told about welding some flexible couplings, made up of two halves with twenty-eight holes in the head in which as many 1¾-in. pins engaged. The holes became worn, some of them as much as to 2 in. in diameter. These were filled up by electric welding and the holes rebored with very satisfactory results.

The discussion then turned to the subject of welding worn flanges on car wheels. It developed that there was considerable difference of opinion as to the advisability of welding flanges, particularly for use on high-speed interurban cars, from the standpoint of safety. There was also expressed a good deal of doubt as to the economy of building up flanges by welding on any class of car wheels. One master mechanic said that he had had varying results in trying to weld flanges. One operator would make a job such that the flange could be turned readily in a lathe. The metal deposited by another would be so hard that it could not be machined at all and could only be dressed up by grinding. The latter flanges, however, never have worn out, he said. He doubted the advisability of using built-up flanges on high-speed cars for he had found that there was a tendency for the flange to check. This has been overcome to a certain extent by welding one layer of metal and then permitting this to cool before building up further, and so on until the three or four layers necessary are completed.

W. H. Goodenough, Mansfield, Ohio, said that he had found it desirable to build the flange up with one layer about one-eighth of the way around the wheel and then go back and start the second layer, thus permitting a certain amount of cooling between layers. However, he said that the welding of axles and wheels had been discontinued because he had had six cases of broken axles, all of which had been electrically welded. He also said that when the welded wheels came back for reshaping it is possible to turn only the tread, and the only means they have available for shaping the flange is a portable grinding outfit.

F. R. Phillips, Pittsburgh Railways, explained that his company was planning to build up flanges on city car wheels by means of an automatic outfit which assured a constant length arc and constant current during welding. He pointed out that the Pittsburgh company now employs sixteen arc welders and nine or ten gas welders, and that plans for a more extensive use of welding processes for reclamation work are being formulated. He said that both electric and gas welding are used because some jobs can be done more economically with one than the other. Referring to the cost side of welding flanges on wheels, he said that before the war a study was made to determine the exact cost of this work, and it was found that with the then prevailing prices for wheels it cost $2 more to reclaim a wheel than to buy a new one. He thought that as wheel prices increase the opportunity for welding becomes more favorable. He contended, however, that with lowering wheel prices, unless the cost of labor is very much reduced, it will not be economical to weld. He said he had had ten years' experience in this welding work and that he was learning new things about it every day. One of these things is that it is possible to carry the idea of reclaiming by welding entirely too far. For example, he has found that it costs more to fill up and rebore the holes in the hangers for Bemis trucks, as they become worn, than it does to buy new hangers. George H. Kelsay, Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio, said that he had experimented with building up flanges, but had found that they chipped off readily and showed other weaknesses and he doubted very much the value of the results obtained. He had not yet been able to bring himself to the point that he was willing to be responsible for the use of wheels thus reclaimed on high-speed cars.



SECTION THROUGH ARMATURE HOUSING, SHOWING SYSTEM OF OIL WASTE LUBRICATION

One man said that his company had fifty Peter Witt type cars equipped with 26-in. wheels on which it was impossible to get even one turning, and the life of the wheels was therefore very short. He had been able to lengthen the life materially by building up the flanges and was now buying an automatic welding outfit for this purpose. These cars, he said, run at 50 m.p.h., and there has been no difficulty with the welded wheels. Mr. Phillips interjected that his company has been experiencing this same short-life difficulty with the small diameter wheels, but that he is not welding them because of the molecular change which takes place in the metal and he did not want to take a chance on such wheels.

GENERAL VIEW OF SHOP AND DIPPING AND BAKING OUTFIT

A. B. Creelman, Youngstown (Ohio) Municipal Railway, stated that he had such poor results from the welding of axles and armature shafts that he had r attempted wheels. He said excellent results had be obtained from welding motor caps and various otl reclamation work about the shop, but he was ve skeptical of the economy and safety of welding flang He said that one might get away with it, but tl one serious accident due to a defective wheel wo offset more saving than could be realized in years. said he had experimented with building up thin flan and had used his best welder. Some 34-in. wheels which the flanges were very thin were built up to sta ard by welding 6 or 8 in. at a time and permitti it to cool. After the wheel was done, he said, y could take a machinists' hammer and knock out a pi of flange with ease. He said it might be possible tl in this case the flange had been too thin to form su cient body on which to start welding.

Some one pointed out that the steam railroads doing some welding of flanges for freight engines, are not doing any of this for passenger engines. said they had not felt they could take a chance had taken the position that welding of flanges on whe used in high-speed service was placing too much c fidence in one man—the welder.

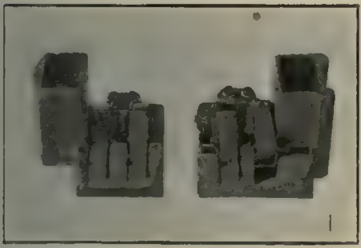
Another man said he had found that the labor volved in welding and turning wheels was so great tl there was no economy in it. Still another mem testified that he had some wheels welded and rewel and that large pieces broke out of the flange both af the original weld and after rewelding. He thou this might possibly be due to running the cars o girder groove rail in the city.

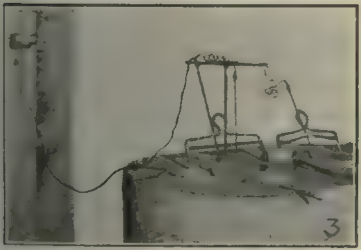
One of the men present referred to the method welding flanges used by E. B. Gunn, master mecha Western Ohio Railway, Wapakoneta, Ohio, whereby worn wheel is turned as near to proper contour as p sible without cutting away an undue amount of tread in order to cut out the groove at the thro This groove on the inside of the flange is then fil up by means of electric welding, rather than build up practically an entire flange without turni the tread at all. This practice saves perhaps ¼ in. more on the tread that would otherwise have to turned off, and at the same time provides a large bo of solid metal in the flange to support the wel metal. The speaker thought that this scheme mi account for the apparent success attained by Mr. Gu The latter's method of welding wheels was fully scribed in a paper by him in the July 17, 1920, issue the ELECTRIC RAILWAY JOURNAL, page 129.

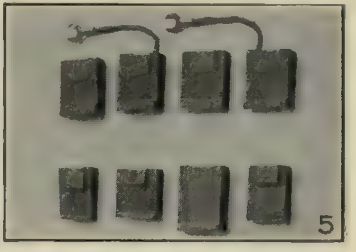
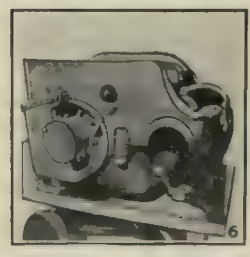
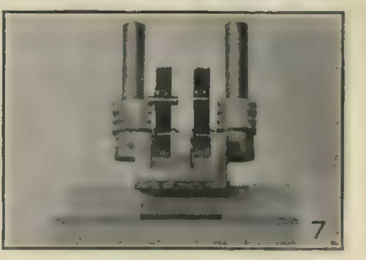
One member had made a careful cost study of case where one wheel of a new pair developed a t flange after it had been in service only a comparativ short time. In such a case, if the wheel is cau before the flange is worn too thin and built up welding, and the pair put in the lathe and both whe turned at the same time, it is possible to save ab $10 over the cost of pressing off the worn wheels pressing on new ones, taking into account the ti involved, scrap value, etc., versus the extra wear deri from welding and the labor involved in that. He s that if the flange is worn too thin, however, the wh is lost. This rapid wearing of one wheel is frequen due to the pair being not properly matched for dia eter. Mr. Kelsay and Mr. Phillips confirmed the co ment that the checking of wheels for diameter can be intrusted to the manufacturers, but must be done the railway shops.

P. J. Wood, Buffalo and Lake Erie Traction Company, upon being asked for his experience, said that he was having very good success with built-up flanges. He has been following this practice for eight months, using simply a resistance type welder and trolley current, and has had no trouble. The flanges built up in this manner are not turned, but are put in service just as the welder leaves them. Mr. Wood said that after the wheels have been back in service for a short time the flange wears smooth and you cannot tell where the weld was made. He considered that there was no object in spending time to machine the flange after welding, for if the welding is well done it very quickly smoothes out and there is no danger at all. These wheels are used on high-speed interurban service.

Several of the equipment men expressed astonishment that the wheels were permitted to go back into service without turning or smoothing up of the welded surface and denoted the feeling that such wheels would be much more likely to climb the rail. As to the cost of welding, Mr. Wood said he did not know the cost, but that the life of the wheels had been increased 25 per cent.





1.—New type insulated point brush-holder for 49, 56 and 68 railway motors.
2.—Through bolt type housing—Split frame motor.
3.—Pyrometer to measure temperature of babbitting metal.
4.—Dipping armature, showing armature clamping details.
5.—Side wear on carbon brushes with and without pigtails.
6.—Old style 101-B motor adapted for use of through bolt housing shown in No. 2.
7.—The effect of long and short brush-holders, contact tips on top carbon wear.

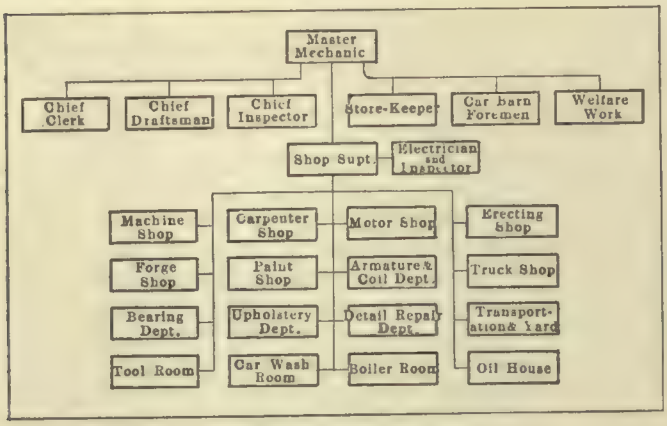
Mr. Creelman concluded the discussion on welding rail flanges by saying that it seemed to be just a matter of taking a chance, and if you got away with it it was all right.

A portion of the talk by Mr. Candy had been devoted to the subject of welded rail bonds. He said that for this purpose one might as well forget anything but a steel tip or steel face bond for welding by the electric arc process. It is so difficult to weld the copper to the rail that it is impractical.

Some one raised the question as to how successful welded bonds have been and the relative merits of gas welding and electric welding of bonds. A representative of the Ohio Brass Company answered that he knew of one road which had installed 60,000 steel tip bonds with the gas weld process and had found the installation most satisfactory. As to the relative merits of the two methods of welding bonds, he said that there was no particular advantage, but that gas welding had been used largely thus far because it had been on the market longer, though he said the arc welding process will supplant the former. He believed this to be the case mainly because of the fact that electric railways always have power at hand, whereas it is sometimes very difficult to secure acetylene gas. This is comparatively easy now, but it was very difficult during the war. The question then becomes one of whether a company wants to go to this trouble or to make use of the energy it has directly at hand. He said that the Ohio Brass Company is putting on the market a portable motor-generator set for electric welding of bonds, which is being made for this company by the Wilson Electric & Bonding Company, New York.

Mr. Phillips commented that it is easier to break in a gas welder than an arc welder. He added that lack of skill is the reason for more failures of arc welds than anything else, and he thought this was largely the result of the very scant instruction usually given men who are put on this kind of work.

Mr. Church spoke briefly of this problem of training welders. He said that one could take two apparently equally good men, give them the same training and one would make a good welder and the other would be no good at all. He had found that if a man were of a nervous temperament he would never make a good welder. He said it takes a slow, steady, conscientious man to make a good welder, though he may have less



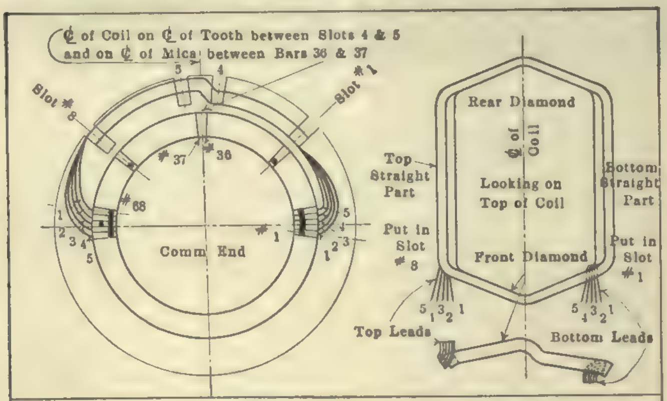
ORGANIZATION CHART

intelligence than another who is more active and excitable. He spoke of one man who had been welding only a month and was already doing excellent work. Others who have been doing welding work for more than a year get hard spots which cannot be machined, causing broken lathe and planer tools, etc. He considered that the operator is an exceedingly important factor in electric welding work.

Answering a question, Mr. Candy said that the job of welding thin cast-iron sections is a very difficult one with the electric arc process. Cast iron is a weak structure to begin with, and as welding progresses the cooling strains set up are very likely to crack the metal at some place other than at the point of welding. The best way to do this kind of welding, he said, is to pre-heat the piece just as it would be handled for gas welding.

ARC WELDING NUTS ON BOLTS

In answer to another question on the use of arc welding for fastening nuts on bolts to keep them from working loose, Mr. Candy said that the Chicago, Rock Island & Pacific Railroad has used this method extensively. A spot weld is made between one face of the nut and the adjacent surface, or between the nut and the bolt. He said this was the only case of this practice that he knew of and he did not know its value.



Laying off Windings

1-The center line of Starting Coil is on center line of Armature tooth between 4th & 5th Slot and on center line of Mica between 36th & 37th Commutator bar
2-Starting at bar 36 count back (clockwise) to bar #1 and in this bar place Lead #1 from bottom Leads of Starting Coil
3-Counting from bars #1 forward (counter clockwise) to bar 68 and in this bar place Leads #1 from top Leads of Starting Coil

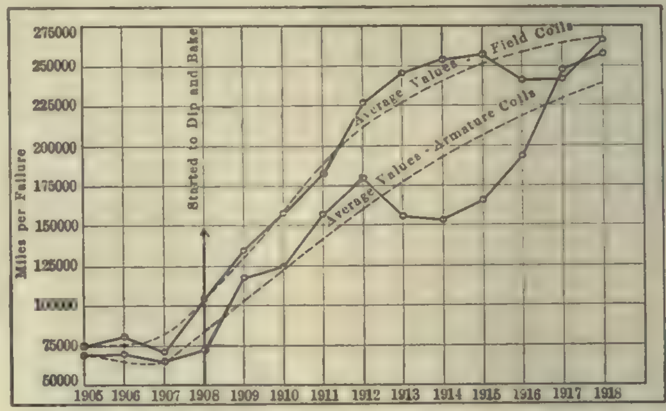
Winding Data

Number of Armature Slots 27
Number of Commutator Bars 135
Coils lie in Slots 1-8
Leads connect to bar 1-68
Commutatar center punched on End
●●●●● -Locates top leads from Starting Coil
●●●●● -Locates bottom leads Starting Coil
● -Locates Starting Coil in Slots 1 & 8

ARMATURE WINDING LAYOUT—RAILWAY MOTOR

In welding special trackwork Mr. Candy said that it was his opinion that best results could be obtained through the use of the graphite electrode process if men are available who know how to use this process.

Mr. Candy then endeavored to answer the question as to what is the most economical electric welding equipment. He explained that when using a metal electrode the voltage across the arc should be about 20 volts. If a 500-volt source of energy is being used, this means that it is necessary to dissipate 480 volts in resistance, or that only 4 per cent of the energy consumed is used in the welding work. If welding is being done with a 110-volt supply, then 90 volts must be dissipated in resistance, or only 18 per cent consumed in useful work. If a motor-generator set delivering 60 volts is used, this means that 40 volts will be dissipated in resistance and that 33⅓ per cent of the energy will be used in the motor-generator set and in the arc. If the machine is 75 per cent efficient, then the over-all efficiency is about 23 per cent. With the one-man type motor-generator welding outfit which is designed for inherent regulation to take care of the variation in length of arc, the over-all efficiency obtained is from 50 to 60 per cent. This is therefore probably the most efficient machine.



DIPPING AND BAKING CURVE SHOWING EFFECT ON LIFE OF WINDINGS

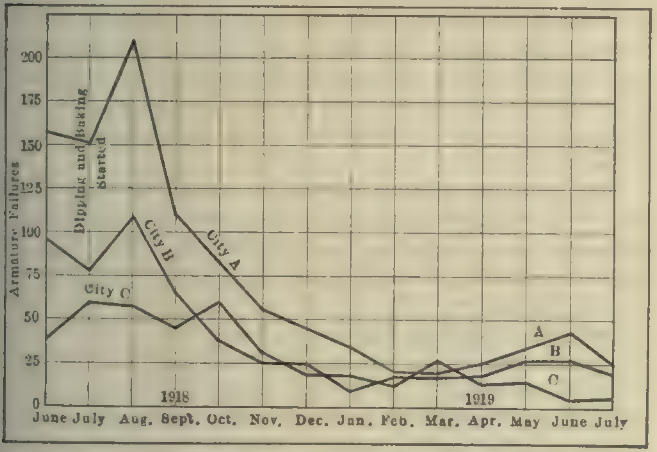
J. S. Dean, Westinghouse Electric & Manufacturing Company, then gave a talk, illustrated with stereopticon slides, on many phases of the maintenance work on electric railway motors, many interrogations being answered as he went along. A great many of the pictures shown were from the shops of the International Railway, Buffalo, N. Y. Among these was an organization chart of the Buffalo mechanical department, some of the shop-record forms, equipment for dipping and baking of armatures and a number of other pictures, some of which are reproduced herewith. In general, Mr. Dean's talk was a sketch of the maintenance practices followed on various roads which have brought good results and the varying experiences in motor maintenance problems.

Speaking of the method of preparing armatures followed at Buffalo, Mr. Dean said that all armatures newly wound or repaired are dipped and baked. If an armature does not come in for repair otherwise, it is brought in anyway every two or two and a half years for dipping and baking. In Buffalo the armatures are dipped with the pinion end of the shaft down, immersing the armature up to the commutator neck. The lower end of the shaft is protected from the varnish by a sleeve which is fitted with packing at the upper end.

Some companies roll the armatures in the varnish instead of dipping them, in order to avoid having to protect either the armature or the pinion end of the shaft. Mr. Dean could not say whether this method was as satisfactory as the dipping method, but he felt skeptical about it. He also mentioned that P. V. C. See, Northern Ohio Traction & Light Company, Akron, Ohio, is considering the possibility of spraying armatures instead of either dipping or rolling.

Turning to the matter of drying armatures after dipping, Mr. Dean said that it had been proposed to spin them in a lathe, but he thought this might throw out too much of the varnish.

Some companies are considering the desirability of dipping and baking the motor frame as well as the armature, that is, putting the whole frame with the field coils in place through this process, instead of simply treating the field coils separately. The idea is that there is a possibility of damaging the coils in installing them after baking.

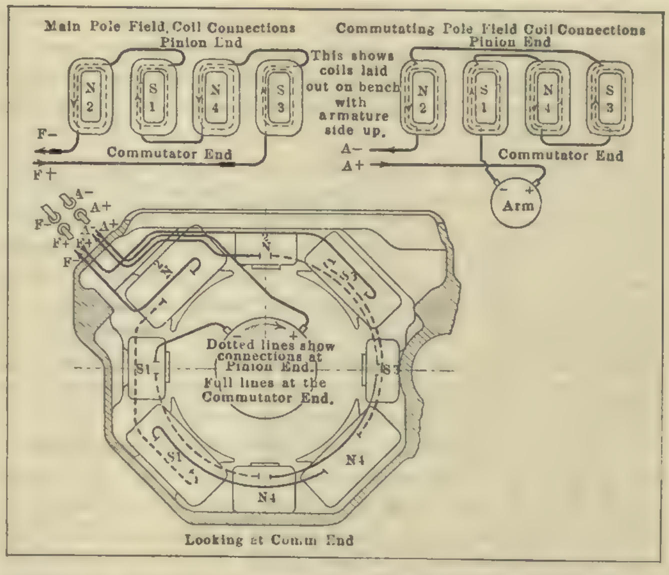


DIPPING AND BAKING CURVE SHOWING EFFECT ON ARMATURE FAILURES

Some one asked about the value of using air-drying varnish instead of dipping and baking. Mr. Dean replied that this was undoubtedly better than nothing, but not as good as the dipping and baking process. Yet he mentioned that he knew of one company that was dipping its armatures but not baking them, on the theory that they were baked on the road. One of the members interjected that the air-drying varnish would give so little penetration that it would result in only a surface treatment and would be of little value. Another man commented that the big problem in armature maintenance was the commutator leads, saying that the coils do not burn out except as the result of lightning. He thought one of the big problems was to get the leads thoroughly packed so that they will be held firmly in place and particularly well insulated.

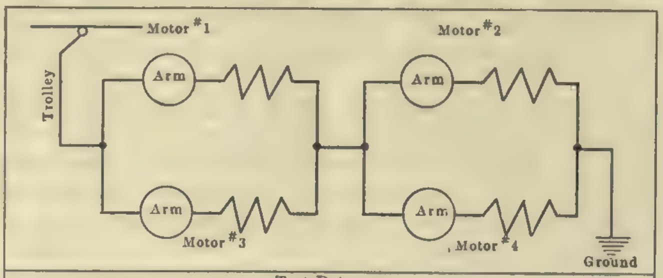
Mr. Dean spoke briefly of banding armatures and said that some companies do not band them, except perhaps for the core bands, until after the armatures have been dipped and baked. This probably permits more varnish to penetrate into the cambric and around the leads.

Endeavoring to answer the question of whether or not it pays to dip and bake armatures, Mr. Dean showed curves from two different companies. One of these showed a distinctly upward trend, since the process of dipping and baking had been started, of increasing life of armatures. The other curve was drawn up to show the number of armature failures, and this showed a decided drop.


Main Pole Field Coil Connections
Pinion End
N 2
S 1
N 4
S 3
This shows coils laid out on bench with armature side up.
Commutating Pole Field Coil Connections
Pinion End
F−
F+
Commutator End
A−
A+
Arm
Dotted lines show connections at Pinion End.
Full lines at the Commutator End.
Looking at Comm End

WIRING AROUND FRAME DIAGRAM—RAILWAY MOTOR

Speaking of the problem of securing correct armature winding, Mr. Dean said that the common practice of the armature winder was to take note of how the armature upon which he was working seemed to be wound, and then follow this in putting in a new coil. He said this was not always a safe thing to do and it sometimes led to a mistake. A damaged armature upon which he may be working may have been wound wrong before. To make the armature winder's work more certain, Mr. Dean showed some charts which the Westinghouse company has had prepared. These show in a simplified manner the method of laying off windings in different type motors. A separate chart has been drawn for each motor, and the armature and field instructions for the same motor are also separated.



Test Data

Test No.	Motors	Control Positions	Amperes per Motor				Line Amperes
			1	2	3	4	
1	All motors cut in	Full parallel	53	53	53	53	212
[illegible]	All motors cut in	Full series	96	48	0	48	96
	Brushes out of #3						
[illegible]	All motors cut in	Full parallel	64	64	0	64	192
	Brushes out of #3						
4	No.1 and No.3 cut out	Full series	0	80	0	80	160
	No.2 and No.4 cut out						

Conditions of Test

a - Test car special and no passenger load.
b - Ammeter was connected in series with car circuit breaker.
c - Rail clean and dry.
d - Trolley voltage high 575 to 585 volts.
e - All observations were taken on a grade at the same location for each test.

Remarks

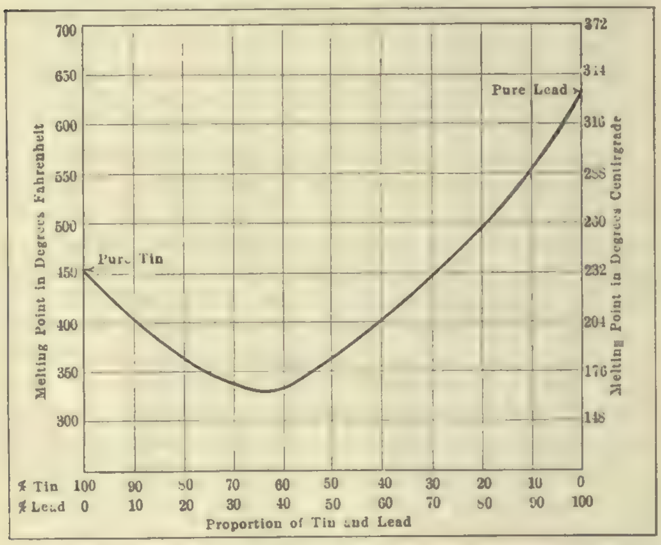
a - Commutation of motors sparkless.
b - Wheels did not slip.
c - Slightly increased noise.
d - Car speed during tests 2 and 3 about normal.
e - Motorman unable to tell whether one motor was cut out by operation of the car.

TEST DATA OF UNBALANCED MOTOR OPERATION

They have found it desirable to have separate charts for the fields and armatures because different men do work on these separate parts of the machine. A pair of these charts is illustrated herewith on pages 540 and 541.

Mr. Dean spoke of the fact that few companies test the fields of motors for polarity. He said a field coil may easily be connected up in the wrong way and that it is very difficult to find this out unless a test is made before putting the motor into service. While a wrong field connection will reduce the speed of a car, the motorman may not notice this readily. He said it is therefore desirable to subject all motors to a load test under low voltage and take note of the speed before putting the motor back in service.

One of the members asked what would be the result of reversing the interpole connections. Mr. Dean said until recently he would have said that under those conditions it would be impossible to operate a motor, for the interpole, wrongly connected, would increase the armature reaction instead of compensating for it and would so buck the fields that a flashover would result. However, recently in Seattle there was a good deal of trouble with motors overheating and it was discovered that the cause was reversed interpoles. The trouble here did not show up in any radical way, but simply produced overheating.



CURVE SHOWING MELTING POINT OF TIN LEAD SOLDER

A question came up as to the proper way to connect the motor circuits, whether the field should be connected to trolley and the armature to ground, or vice versa. Mr. Church, Pittsburgh Railways, said that they used to connect the armature to trolley and the fields to ground and had a good many armatures fail from lightning. They then reversed the connections and had less loss of armature but more trouble with the fields. He thought it was just a question of whether it was better to burn out armatures or field coils. He considered that it was easier to replace a field coil, and so the practice in Pittsburgh is now to connect the field to the trolley. He also thought that there was less likelihood of a flashover if the connection is from trolley to field, for this places less voltage across the armature.

Mr. Kelsay added that any external disturbance is likely to have less effect upon the motor if the connection is from trolley to field, for the field coil then acts as a choke and tends to cut down the flash. How ever, for any internal motor trouble it does not mak any difference which way the connection is made.

COMPOSITION OF SOLDERING ALLOYS

At this point an interesting curve was pictured o the screen showing the effect on melting point of vary ing combinations of lead and tin to make solderin alloys. Mr. Dean pointed out that for purposes c soldering commutator leads a soldering metal containin 15 per cent lead and 85 per cent tin gives the bes results. For soldering fields the best alloy is 60 pe cent lead and 40 per cent tin. He cautioned agains getting too high a percentage of tin, saying that it very high affinity for copper causes it to eat into th copper. For soldering armature bands he recon mended the use of pure tin solder, saying that it woul give a 10 to 15 per cent longer life than a lead solde

Mr. Creelman said the Boston Elevated Railway ha very good success in the use of pure tin for solderin commutator leads. He said the solder would eat awa the soldering iron and caused a great deal of trouble i this respect, but once the leads were soldered, the mel ing point was so high that the solder never melted out i a flashover.

The subject of armature coils becoming loose unde the bands was brought up and it was found that on company had overcome this trouble by eliminating th special insulation usually placed over the coils and under neath the bands. It seems that this insulation some times works out and leaves the coil loose. This compan did away with the band insulation by putting a heav enough insulation on the coil itself to protect it fror the bands, which were then wound tight against th coils. Under this scheme no difficulty has been foun in keeping the coils tight.

Mr. Dean then turned to the subject of babbittin bearings and presented some curves to show the result of bringing the babbitting metal to too high a tempera ture, of pouring it too cold or too hot, etc. He sai that it is extremely important that the temperature o the metal be carefully controlled in order to get goo results, and stated that the proper temperature for pour ing is between 460 deg. and 480 deg. C. These figure apply to either a tin or lead base metal, except tha the limitations of temperature are not so close on tin base. He showed a picture of the automatic contr of the temperature of the babbitting metal used in th Westinghouse Electric & Manufacturing Company' plant. A number of the members present commente that they were never able to get as long life out o bearings poured in their own shop as they did out o the original bearings which came from the manufac turers' plant, and it was concluded that this matter o proper control of temperature probably gave the ex planation. Mr. Church of the Pittsburgh Railway said that the life of bearings had been doubled o perhaps tripled on his system through the installatio of a temperature indicator, which simply kept th workman advised of the temperature though it did n control the temperature.

The discussion then turned to the method of oilin modern motors provided with oil wells. Mr. Dean urge the railway men to make sure that the oil was poure into the well to feed up through the waste from th bottom and not poured over the top of the waste. E said that it was only a waste of oil to pour it on th top and that this accounted for the oil-streaked stree and for oil getting inside the motors. Mr. Church, Pittsburgh, thought it was desirable to pour a little of the oil on top of the waste, for he had found that otherwise the bearings have a tendency to turn black, indicating that they are not getting quite enough oil. He was of the opinion that it is better to have a little excess and thereby be sure of enough. Mr. Creelman thought it was a good idea to put some oil on top of the waste, as it forms a kind of seal from the air, which causes a better rise of the oil up through the waste from the bottom of the well. Mr. Dean contended that too much oil was used as a rule and that oilers should be instructed to keep away from pouring any on top of the waste.

RELATION OF PRESSURE TO BRUSH WEAR

Taking up the subject of what is the proper brush pressure to use, Mr. Dean said that under ordinary practices 5 to 6 lb. per square inch is about right. Under bad track conditions, however, it is often found that 7 or 8 lb. is better. Where this had been recommended in a few cases, he said that the brush manufacturers had objected on the ground that it wore the brushes down too fast. He said he found that brush wear was more likely to be due to too little pressure than too much, for it comes more from burning than it does from friction. He remarked that it is a very good idea to give the brush-holders a very little light oil now and then, for particles of carbon worked into the joints and made them stiff and "screechy."

Mr. Dean then showed some interesting pictures of brushes which had been tested for side wear. He said that it had been practically impossible to determine the cause of this side wear, which is more or less trouble to nearly every property. The tests seemed to indicate practically the same wear whether the brushes were shunted or unshunted, and the grade of carbon, curiously enough, does not seem to make any difference either. He has observed, however, that the side wear seems to be more noticeable on ventilated motors than on the non-ventilated type and he has an idea that the dust and dirt drawn into the motor may have a good deal to do with the side wear of the brushes. He said that the Public Service Company of New Jersey had filled the ventilating ports of some of their motors with hair to catch the dirt and while they had cut down the brush wear they had also cut the rating of the motors, for samples of the hair sent to the Westinghouse factory showed that it became so thoroughly matted or clogged with dirt and dust that it stopped all ventilation. This concluded Mr. Dean's talk.

TROLLEY BASE TENSION DISCUSSED

The question was raised as to what tension is generally used on trolley bases on interurban service. The answers given showed that it varied from 30 to 36 lb. on the different properties represented. The pressure for city cars was said to be 25 lb. on the average.

W. H. Bloss, Ohio Brass Company, commented that he had observed that the companies which were using the lightest pressure were the ones that were buying the least overhead material. He commented also on the fact that the pressure used on many interurban cars is far too severe for city overhead construction. He said he was surprised that no one had said that the pressure he used was more than 36 lb., for he had found it to run 40, 50 and 60 lb. Where such cars come in over city tracks the high trolley pressure is hammering out all the overhead special work very rapidly. He said that this pointed to the desirability of using a type of base which would compensate for the height of the wire and not put unwarranted pressure on the low wire in order to make the trolley operate satisfactorily under high wire. The trolley bases which automatically increase the pressure as the angle to the roof increases and decrease the pressure as the angle decreases are desirable, for they take care of high wire at crossings and avoid overpressure on low wire.

Mr. Kelsey brought up the subject of using full bronze bearings instead of babbitted bearings. He said he is trying them out on account of the large number of bearing failures that have been occurring on his railway. The bearing housings are being redesigned so that the thickness of the bronze shell can be cut down. Later on if the shell gets loose the housing can be bored out and a larger size shell used. He spoke also of a recent scheme of using a bronze bearing without turning it. He referred to bearings manufactured by the American Crucible Products Company, which are so treated and cast that they are smooth enough outside to give a good fit in the housing and smooth enough inside so that they do not need to be turned for the bearing surface.

HOT BEARINGS RESULT FROM CARELESSNESS

E. M. Williams, chief engineer of this company, who was present, was called upon. He said that most hot bearings are the result of carelessness, that any bearing is all right as long as it is properly oiled, but the test of the bearing comes when oiling is neglected. He explained that with a babbitt-bearing metal if the temperature rises to 350 deg. the bearing is gone, while a bronze bearing such as made by his company will withstand a temperature of 1,200 deg. without melting. This metal had the further advantage that lubrication is provided in the metal, so that it contains considerable natural lubrication. Another interesting point made was that babbitt bearing tends to run hot before the bearing is run in the first time. The impregnation of graphite into the bronze metal, however, takes care of this initial wearing in. Mr. Kelsey showed a bronze bearing of this type which had run hot, causing a film of metal to melt out of the bearing, exposing a new surface of the natural lubrication in the bearing which permitted the car to continue its run, the heated bearing not showing up until the inspection at the end of the run.

Mr. Creelman, Youngstown, said that he had been able to get much better results from solid babbitt bearings than from the babbitt-filled shell-type bearings. He said the reason the railways never get as good life from bearings rebabbitted as they do from the original bearings received from the factory is that a perfect thermal weld between the babbitt and the cast-iron shell is not secured, and this leaves a slight space in between the two metals.

Some discussion followed on the value of automatic slack adjusters for brakes. All of the makes on the market came in for favorable comment when installed under proper condition, although it seemed to be the opinion that none of these is adaptable to all kinds of trucks. It was very clearly brought out that there is a great field for the slack adjuster, for it was stated that if one is installed which works properly it is possible to cut the inspection force in half and the period of inspection can be lengthened.

Maintenance of Portable Electric Drills

To Obtain the Best Performance and Longest Life from the Various Parts Regular Inspection and Repair Should Be Carried Out with the Same Thoroughness as with Other Electric Motors

By E. L. Connell
Chief Engineer Van Dorn Electric Tool Company, Cleveland, Ohio

THE portable electric drill is essentially an electric motor, and it should be given the same protection and consideration as is usually given to such apparatus. The small sizes in common use are equipped with a universal motor which drives through the chuck and train of gears, so as to reduce the speed to from a fifth to a twenty-fifth of that of the armature. Electric power is ordinarily supplied through a flexible cable, and the motor is controlled by a switch conveniently located on the handle of the drill.

Armature Should Be Given the Best Possible Attention

The armature is the most delicate part of any motor, and this is the part that should be the first examined if the machine shows signs of distress. Often a motor is burned out through neglect promptly to repair trouble which develops in the armature. If severe sparking takes place between the brushes and commutator, the machine should be taken out of service at once and given a thorough inspection. The motors of electric drills are subject to the usual "diseases" of electric motors, which may be detected in the usual way. Grounds can be located with a magneto ringer, and if no ground is detected in the armature, the field, switch and cable connections should be tested. An open circuit in the armature will be shown by burning between the commutator bars, to which the open coil is connected. A short circuit within a coil will burn out the "shorted" turns and a "short" between commutator bars will overheat the bars so "shorted." A short circuit between commutator bars may sometimes be repaired if discovered before the coil is burned by removing the foreign substance between the bars, but an open or short-circuited coil requires a rewinding. If the armature is built with open slots and with form-wound coils, repairs can often be made economically by the average repair man with coils purchased from the manufacturer. If the armature is built with semi-closed slots, it will probably be best to return it to the maker for rewinding.

The brushes used in such motors are chosen by the manufacturers after exhaustive tests to obtain the best performance and longest life. It is, therefore, imperative that only such brushes as are approved by the maker of the machine be used. A brush made from any material which happens to be convenient may ruin the motor. Some of the effects produced from improper brushes are overheating from friction, sparking or high resistance. If the material used in the brush is too hard, the friction and wear on the commutator will be excessive, and if it is too soft, the mica may wear high between commutator bars and cause chattering and destructive sparkling. If the resistance of the brush is too low, there will be an excessive short-circuit current which will cause sparking and overheating of the commutator and armature coils, while if too high the normal current may overheat the brush and cause rapid wear.

It is best to examine the brushes before the expiration of 200 hours of actual running time, and it will be a help to clean the commutator with fine sandpaper several times during the life of the brush. The tension on the brushes should be uniform and just sufficient to prevent arcing on a smooth commutator. A tension of at least 4 lb. per square inch of brush contact is usually necessary. Should the commutator become rough, the armature should be removed and the commutator refinished by taking a very light cut in a lathe.

Fields are not apt to fail frequently, but they are occasionally burned out through the operation of the tool after the armature has become defective. A short-circuited field coil will cause overspeeding or flashing when the switch is closed. The best field coils have windings treated with an impregnating varnish, and this feature is considered extremely important by the manufacturers.

Grease-lubricated tools provide a maximum of cleanliness with a minimum amount of attention. It is considered good practice to replenish the grease supply as often as the tool is cleaned or inspected, which on account of brush wear should not exceed 200 hours of service.

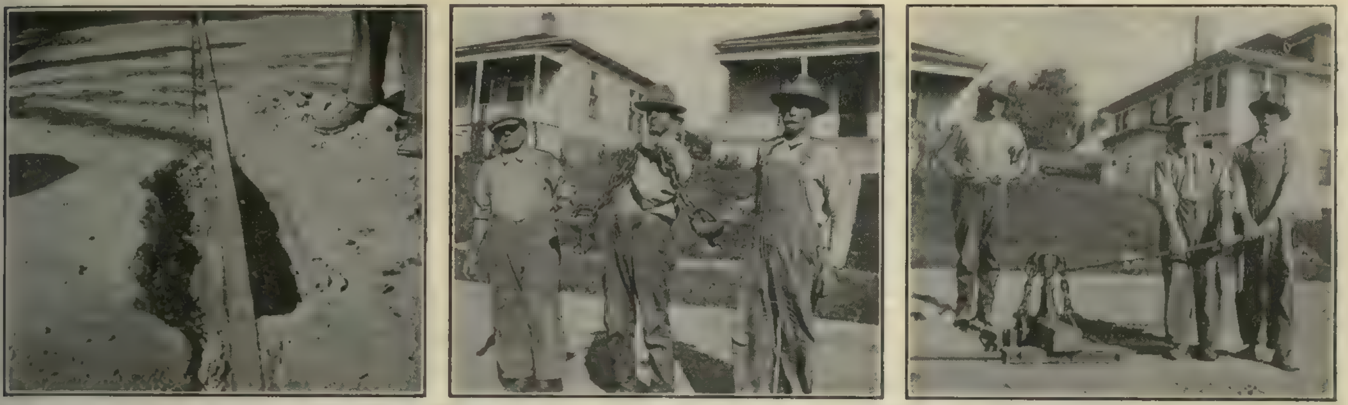
The cable connection is very often abused by using it to drag the tool around. Some cables are, of course, better than others, but all require reasonable consideration. When a tool is to be used in one position for long periods, the tool and cable should be suspended from above with a counterweight. The machine is then always accessible and free from cable abuse.

Sometimes, when used in drilling sheet metal, the lip of a drill will catch as it breaks through, thus stalling the machine. This trouble can be prevented by grinding the drill especially for this work. The angle of the point should be reduced to give a longer point, and the sharp angle at the cutting edge should be ground off slightly to give the same results as would a smaller angle of the spiral flute to the axis of the drill. The standard angle used is 59 deg. Proper grinding may also help to prevent "grabbing" in soft material and will allow high feed pressure without chipping the cutting edges in very hard material. For drilling in wood the type of drill necessary will depend upon the condition and kind of wood and depth of the hole. In the drilling of green wood the hole should be cleared several times if the depth of the hole is many times its diameter.

Repair Shop Like a Hospital

IN THE Feb. 26 issue of the *Electrical World* James Dixon likens a repair shop to a hospital. He says a winding room ought to be antiseptic and therefore should be entirely removed from all machine shop operations and shut off by a wall. A chip of metal in the insulation of a motor that is being repaired is like a germ in an open wound, sure to cause trouble later. The same idea applies with full force to commutator work.

Mr. Dixon carries the thought further by stating that in a hospital the patients who are cured are not left lying around in the operating room. So neither should repaired machines or parts be kept lying around the shops where other repair work is being done. A suitable storeroom, separate but accessible, with proper crane service, racks and protection from dirt, should always be provided for raw materials and finished work.



AT LEFT, OPENING IN CONCRETE PAVING MADE IN ORDER TO REPAIR JOINTS. IN CENTER, HEAVY CHAIN AND RAIL GRIPS USED IN LIFTING LOW JOINTS. AT RIGHT, CHAIN AND JACK ASSEMBLY IN POSITION TO LIFT RAILS

Concrete Paving Repair by Novel Method

Old Removed Asphalt Pavement Melted Up to Fill Holes—Cheap, Quick and Apparently Successful Method of Repair Made Possible Through Use of Waste Material

By R. C. MILLS
Vice-President Sioux Falls (S. D.) Traction System

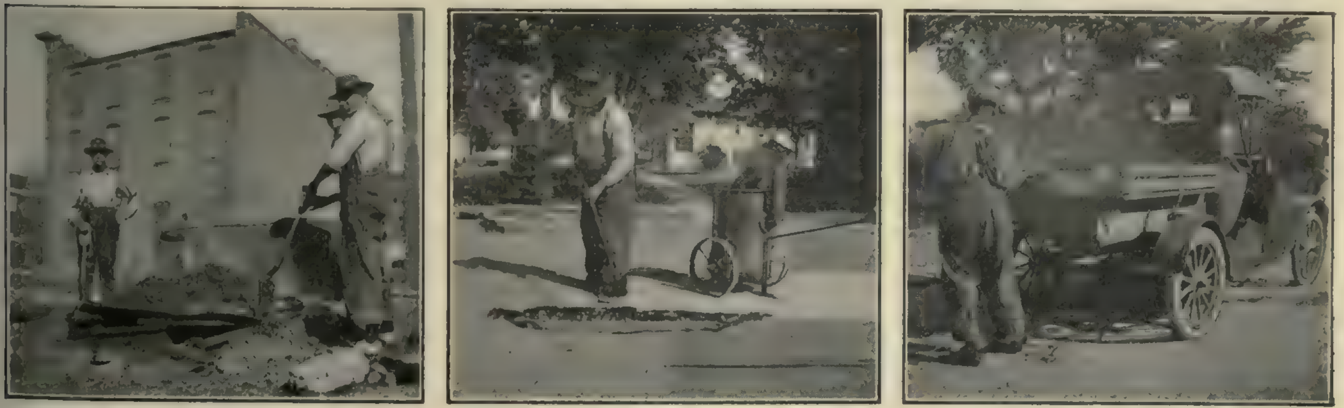
LAST summer we repaired five blocks of concrete paving between our tracks on the main business street of Sioux Falls, making use of a method which was rather inexpensive and apparently successful from the standpoint of both appearance and service.

This pavement, laid in 1914, was a mixture of sand, crushed granite rock and cement extending in a monolithic slab from the bottom of the ties to the top of the rail, a depth of 14 in. The track construction has remained solid and there has been no trouble from loose or working rails or joints, but the continual abrasion of the motor trucks and steel-tired vehicles had worn deep ruts along the flangeways and, in some places, along the sides of the track construction. Cup-shaped holes as large as a dishpan had been worn out at various points along the center of the track. The pavement was therefore in a very unsightly and dangerous condition for vehicular traffic, and as a result it was several times sarcastically referred to by one of our local papers as resembling the shell holes of the battle fields of Europe.

In 1919 we attempted to repair some of the worst places by trimming up the holes and relaying granite blocks grouted in with concrete. This was found to be a very laborious and expensive undertaking, particularly that part of the work involved in preparing the holes for laying the blocks. We first tried cutting out the old concrete with chisels and mauls, but could not hold men on the job and finally gave this method up. Later, air hammers with bull points were used to drill holes close together and down the depth of the blocks to be laid, breaking out the intervening concrete with bars and wedges. This method was also too slow and expensive and was given up, and the remainder of the street left in bad condition until last summer, when our other work was sufficiently well taken care of to permit of taking up the repair of this pavement.

OLD PILE OF ASPHALT BECOMES ASSET

Having a quantity of old asphaltic concrete pavement on hand which had been removed from our tracks in the residence district, we constructed a furnace in the



AT LEFT, HOW THE OLD ASPHALT PAVEMENT WAS MELTED UP. IN CENTER, PAINTING THE OPENING IN THE PAVEMENT WITH HOT TARVIA AS A BINDER BETWEEN THE ASPHALT AND CONCRETE. AT RIGHT, METHOD OF HAULING AND SPREADING THE ASPHALT TO FILL THE OPENINGS ground near the street to be repaired and covered it with a sheet of boiler plate about 7 x 10 ft. in size, on which to melt up the old asphalt. The process used in filling the holes in the pavement and along the flangeways was first to clean out the holes to be filled with a wire brush and then paint the whole surface with hot tarvia. Before this had a chance to cool the melted asphalt mixture was poured into the hole until it was slightly more than filled. Hot tampers were then used thoroughly to compact the mixture, and while still hot the surface was liberally sprinkled with a dry mixture of half sand and half cement.

The work of repairing the holes by this method progressed very rapidly and the entire job was completed within two working days. In making this kind of repair it is very essential that street sprinkling be discontinued for at least twenty-four hours before attempting to put in these patches, as the concrete must be absolutely dry, and the hotter the day the better the finished results. No attempt was made to protect the patches from traffic, which was permitted to pass over them as soon as laid, with no apparent damage.

AT LEFT, TAMPING THE ASPHALT SOLID INTO THE OPENING. CENTER AND RIGHT, A WORK CAR, EQUIPPED WITH SIDE OUTRIGGING TO DRAG PLOW, FACILITATES EXCAVATION FOR NEW TRACK

It may be that winter traffic and excessive cold may cause some failures in this repair work, but we are satisfied that we have a cheap and rapid method of repairing concrete pavement, and if some defects do appear in these patches within the next few months it will be a small matter to touch them up or make renewals.

Possibly this method of making repairs is not new to other roads, but we have never read of it. The credit for our job is due J. K. Gibson, our superintendent, who watched some repairs being made by the city on asphalt pavements and conceived the idea that the same method would work out in repairing holes in concrete. While we were at first skeptical, we are now very enthusiastic over the results obtained, and our pile of old broken-up asphalt becomes an asset in making future repairs.

PICTURES SHOW HOW WORK WAS DONE

Several accompanying pictures illustrate the methods used in making the rail joint and pavement repairs. The first view shows a low joint, around which the concrete paving has been broken out in readiness for raising the joint. The second and third pictures show the chain and screw jack assembly with which the rails are raised at the joint. It will be noticed that the chain and rail grips are very heavy, as they have to withstand a terrific strain. In rehabilitating the joints, the angle bars are of course removed from the rails before this lifting device is put in place. The rails are then hoisted to an elevation sufficient to place shims of the desired thickness on top of the ties. If the old angle bars are worn or defective in any way they are replaced with new ones, to insure a good tight smooth-running joint. We have used this method for several years and have always found it very satisfactory.

The succeeding pictures show our method of melting the asphalt, painting the opening with hot tarvia as a binder between the asphalt and the concrete, hauling, spreading and tamping the hot asphalt in place. There should have been one more picture showing the patch after it had been smoothed out with a hot paving iron and the finished surface sprinkled with a sifted mixture of half sand and half cement. After this is done, the surface is left as smooth as the rest of the pavement and the sand and cement soon work into the asphalt under the effect of traffic and leave the patch hardly discernible from the remainder of the pavement.

EFFECTIVE MEANS OF EXCAVATING TRACKWAY

The last two pictures show the method we used last summer for plowing up the roadway on both sides of a single track, preparatory to the installation of a diamond point passing switch. An extra heavy, well-ironed breaking plow was attached to a 10-in. x 10-in. timber which was fastened as a side outrigger on a work car. The position of the furrow with respect to the track was adjusted by sliding the heavy chain which pulled the plow back and forth on the outrigger timbers. The street on which this job was done had been covered with cinders two or three years previously which had become very hard and compact. I doubt if six horses could have handled this plow, and we accomplished more with this improvised outfit in three hours than could have been accomplished by sufficient teams in a day's time.

The American Engineering standards committee has been enlarged recently by the addition of representation from the United States Department of Agriculture, from United States Department of the Interior, from a group representing the American Gas Association, the Compressed Gas Manufacturers' Association and the International Acetylene Association and from the American Electric Railway Association.

Determining Forces in Brake Rigging*

With the Air Pressure in the Brake Cylinder or the Force Applied to the Handle of a Hand Brake as the Starting Point, the Author Shows How the Forces Which Are Developed in All Members of a Foundation Brake Rigging Are Computed

BY H. M. P. MURPHY

IN AN article published in the Feb. 19 issue of the ELECTRIC RAILWAY JOURNAL I gave the principles of operation and methods of calculating forces for he most common types of handbrakes used on electric ars. In this article the forces developed with air rakes will be considered and then the calculation will e followed through the various levers and rods contituting a foundation brake rigging to give the force cting on the brake beams at the wheels.

In computations of the forces developed in a foundaion brake rigging of a car with air brakes, the initial orce used is that exerted by the brake-cylinder push od. This force depends on the air pressure in the ylinder and on the size of the piston. In dealing with rake-rigging problems it is customary to use certain tandard air pressures. Those most commonly used are 50 and 60 lb. per square inch.

In order to provide a direct means for determining he total force exerted on the push rod of any standard ylinder, the accompanying table has been compiled and hould prove of much value in this connection. In xceptional cases, where the use of the table is not possible, the desired total push-rod force may be computed directly in the following manner:

TABLE OF BRAKE-RIGGING DATA

Diameters of Brake Cylinders and Areas of Pistons

iam in Inches..	6	8	10	12	14	16	18
rea in sq.in.....	28.274	50.265	78.540	113.10	153.94	201.06	254.47

Total Forces in Pounds on Cylinder Push Rods

yl Pres. Lb per Sq In.	Diameters of Cylinders in Inches						
	6	8	10	12	14	16	18
50	1,414	2,513	3,927	5,655	7,697	10,053	12,724
55	1,555	2,765	4,320	6,221	8,467	11,058	13,996
60	1,696	3,016	4,712	6,786	9,236	12,064	15,268
65	1,838	3,267	5,105	7,352	10,006	13,069	16,541
70	1,979	3,519	5,498	7,917	10,776	14,074	17,813
75	2,121	3,770	5,891	8,483	11,546	15,080	19,085
80	2,262	4,021	6,283	9,048	12,315	16,085	20,358
85	2,403	4,273	6,676	9,614	13,085	17,090	21,630
90	2,545	4,524	7,069	10,179	13,855	18,095	22,902
95	2,686	4,775	7,461	10,745	14,624	19,101	24,175
100	2,827	5,027	7,854	11,310	15,394	20,106	25,447
105	2,969	5,278	8,247	11,876	16,164	21,111	26,719
110	3,110	5,529	8,639	12,441	16,933	22,117	27,992

To find the total force exerted on any brake-cylinder push rod, multiply the decimal fraction 0.7854 by the square of the inside diameter of the brake cylinder (in inches) and multiply this product by the specified cylinder air pressure (in pounds per square inch). The "square of the diameter" means, of course, the product obtained by multiplying the diameter by itself. As an example of this method, let it be required to find the force exerted by the push rod of a 10-in. brake cylinder when the cylinder air pressure is 50 lb. per square inch. To solve this problem, first find the square of the diameter of the cylinder, which is 10 × 10 = 100, then multiply the decimal fraction 0.7854 by this number (*i.e.*, 100); this gives 78.54. Finally multiply this last quantity by the cylinder air pressure of 50 lb. per square inch, thus, 78.54 × 50 = 3,927 lb., which is the desired force.

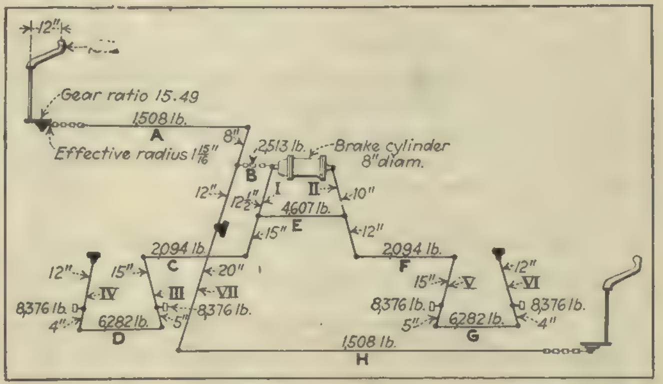


FIG. 1—BRAKE LEVERAGE DIAGRAM FOR DOUBLE-TRUCK CAR WITH INSIDE-HUNG BRAKESHOES

In order to give a clear idea of the general arrangement of the several parts, and of the methods of connecting the levers, etc., of standard forms of air-brake riggings, Figs. 1 to 3 have been prepared, and will be analyzed carefully in the following examples, which also serve to illustrate a few of the practical uses of the "Leverage Rule" given in the first of this series.

It is important to note here that, in the examples about to be given as well as in all subsequent problems, the "upper" and "lower" end points of levers referred to simply indicate the relative location of these points in the figures concerned and have no reference whatever to their actual location when the rigging is installed on cars or locomotives.

AIR-BRAKE RIGGINGS AND EXAMPLES

Let us first consider a brake rigging of the type illustrated in Fig. 1. This is a common form of electric car brake rigging with inside-hung brakeshoes. Let it be required to find the forces delivered to each of the four brake beams, when an 8-in. diameter brake cylinder and an air pressure of 50 lb. per square inch are employed, the dimensions of the various levers being those indicated in the diagram.

To solve this problem, it is first necessary to know the total force exerted by the cylinder push rod. This may be calculated or it may be found more easily by aid of the table, which gives the desired value as 2,513 lb. That is, a force of 2,513 lb. acts on the upper end of the cylinder live lever I. Now to find the forces delivered to the brake beams of the left-hand truck, it is obvious that the force on the tie rod *C* must first be found. This may, of course, be accomplished by aid of the "Leverage Rule." Thus, consider the middle point of lever I as the fulcrum, then

$$\text{Desired force} = \frac{(\text{Known force}) \times (\text{Lever arm of known force})}{\text{Lever arm of desired force}}$$

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*This is the third of a series of articles on forces developed in the brake rigging. Others appeared in the Jan. 15 and Feb. 19 issues of this paper.

Force on rod C =

$$\frac{\text{(Force on push rod)} \times \text{(Lever arm of force on push rod)}}{\text{Lever arm of force on rod } C}$$

$$\text{Force on rod } C = \frac{2{,}513 \times 12\frac{1}{2}}{15} = 2{,}094 \text{ lb.}$$

To find the force exerted on the brake beam attached to the truck live lever III, it is necessary merely to consider the lower end point of this lever as the fulcrum and again to apply the "Leverage Rule," thus:

Force on brake beam of lever III =

$$\frac{2{,}094 \times 20}{5} = 8{,}376 \text{ lb.}$$

Also, to find the force exerted on the brake beam attached to the truck dead lever IV, the force on rod D must be found. This may be done by aid of the "Leverage Rule" by considering the middle point of lever III as the fulcrum; thus:

$$\text{Force on rod } D = \frac{2{,}094 \times 15}{5} = 6{,}282 \text{ lb.,}$$

or the force exerted on rod D could have been found from the fact that either end force is equal to the middle force minus the other end force. Applying this principle we have:

Force on rod D = (Force on brake beam of lever III) — (Force on rod C) = 8,376 — 2,094 = 6,282 lb.

Of course, these methods are equally accurate, and the latter is much the easier one to use, but usually it is well to employ both and thus check the computations. With the force on rod D found, in order to find the force delivered to the brake beam attached to lever IV it is necessary only to consider the upper end point of the truck dead lever IV as the fulcrum and to apply the "Leverage Rule," thus:

Force on brake beam of lever IV =

$$\frac{6{,}282 \times 16}{12} = 8{,}376 \text{ lb.}$$

Now to find the forces delivered to the brake beams of the right-hand truck, the force exerted on the tie rod E must first be found. This may be done by considering the lower point of the cylinder live lever I as the fulcrum and applying the "Leverage Rule," as follows:

$$\text{Force on rod } E = \frac{2{,}513 \times 27\frac{1}{2}}{15} = 4{,}607 \text{ lb.,}$$

or the force exerted on rod E could have been foun from the fact that the middle force is always equal t the sum of the two end forces, consequently we ca obtain this value from,

Force on rod E = (Force on rod C) + (Force on push rod) = 2,094 + 2,513 = 4,607 lb

Also to find the force exerted on rod F, consider th upper end point of the cylinder dead lever II as th fulcrum, whence,

$$\text{Force on rod } F = \frac{4{,}607 \times 10}{22} = 2{,}094 \text{ lb.}$$

Then to find the force delivered to the brake beam o the truck live lever V, consider the lower end point o lever V as the fulcrum and apply the "Leverage Rule, thus:

Force on brake beam of lever V =

$$\frac{2{,}094 \times 20}{5} = 8{,}376 \text{ lb}$$

Next to find the force acting on rod G, consider th middle point of lever V as the fulcrum, whence:

$$\text{Force on rod } G = \frac{2{,}094 \times 15}{5} = 6{,}282 \text{ lb.}$$

or

Force on rod G = (Force on brake beam) — (Force on rod F) = 8,376 — 2,094 = 6,282 lb

Also to find the force on the brake beam of the truc dead lever VI, consider the upper end point of lever V as the fulcrum, whence:

Force on brake beam of lever VI =

$$\frac{6{,}282 \times 16}{12} = 8{,}376 \text{ lb}$$

This completes the solution of the problem, the force delivered to the four brake beams having been found It should now be observed that all of these forces ar equal (8,376 lb.), as they should be when the weigh of the car is evenly distributed on the eight wheels. I will, moreover, be noted that in the course of th preceding solution the values of the forces acting o levers I, III and V were checked by a double calculation If it is also desired to check the values of the force acting on levers II, IV and VI and at the same time t find the forces exerted on the fixed centers of thes levers, it is merely necessary to apply the "Leverag

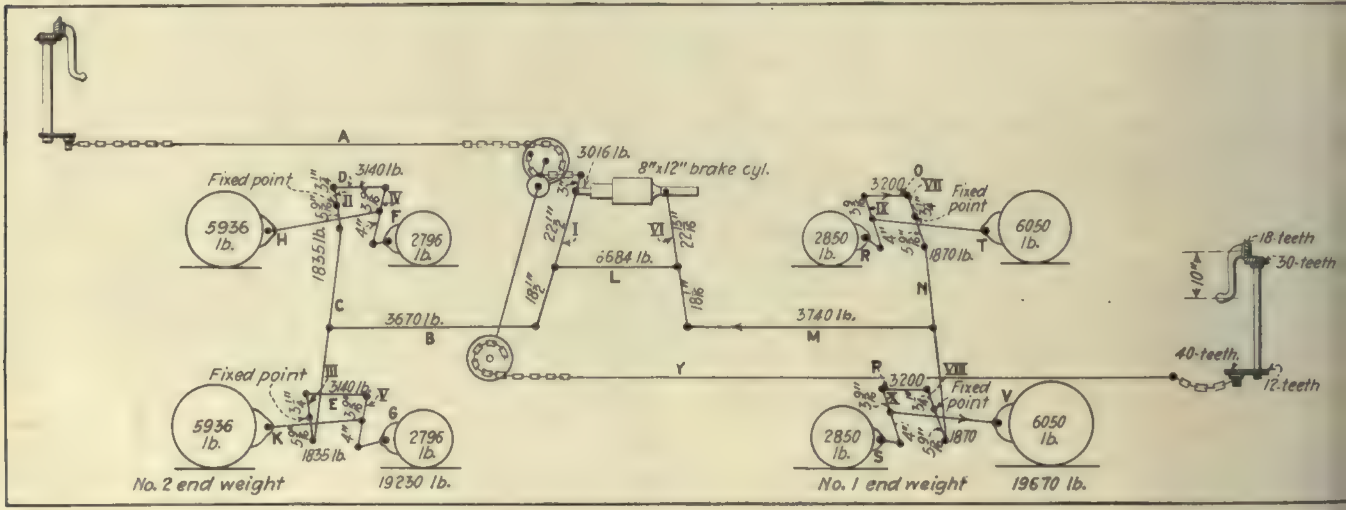


FIG. 2. BRAKE LEVERAGE DIAGRAM FOR CAR WITH MAXIMUM TRACTION TRUCKS

Rule" to determine the unknown force in each case and to see that the sum of the two end forces is always equal to the middle force; thus, to check the values of the forces acting on lever VI, consider the middle point of lever VI as the fulcrum, then:

$$\text{Force at fixed end} = \frac{6,282 \times 4}{12} = 2,904 \text{ lb.}$$

And to check the values of the three forces acting on lever VI,

$$\text{Force on brake beam} = (\text{Force on rod } G) + (\text{Force at fixed end})$$

or

$$8,376 = 6,282 + 2,094$$

It should now be observed that in order completely to solve the foregoing example, or any other problem in which it is desired to find the forces delivered to the brake beams connected with a leverage system, the first step is to ascertain the size of the brake cylinder and the air pressure on which the calculations are to be based. Second, the total force acting on the cylinder push rod should be computed or obtained directly from the table. One of the forces acting on the cylinder lever having been thus determined, it is then necessary to follow through the system first to one truck and then to the other, computing the unknown forces developed at the various points of the levers by aid of the "Leverage Rule" and checking the values thus found when this is considered desirable. It should also be noted that, in order to determine the forces acting on any specified lever, one of these forces must always be given or ascertained from the previous calculations or data on the problem, then either one of the two remaining forces can be found by aid of the "Leverage Rule." It is merely necessary to note the point of application of the known force and the point of application of the desired force and to consider the third point (or pin center) as the fulcrum.

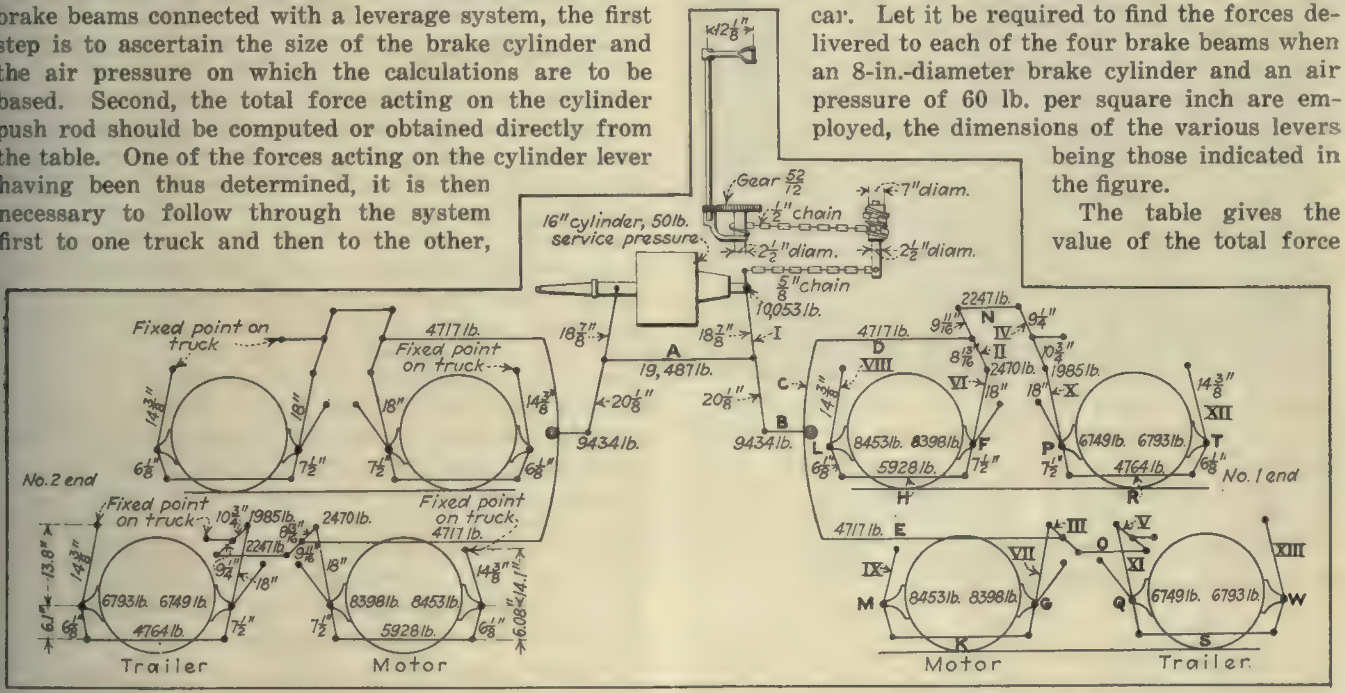


FIG. 3. BRAKE LEVERAGE DIAGRAM FOR CAR WITH CLASP BRAKES

Another fact of great importance, which has been previously emphasized and which is clearly demonstrated in the solution of this problem, is that the term "fulcrum" simply indicates the point about which a lever is considered to turn and, as during an application of the brakes each pin of a lever always rotates somewhat in its hole, any one of the three pin centers or lever points may be treated as the fulcrum with an equal degree of accuracy whether there is a fixed point or not.

In the additional examples, which will be given to illustrate the practical applications of the "Leverage Rule," the facts outlined in the preceding paragraphs will be assumed as being thoroughly understood, and, therefore, the solutions will not be so fully detailed as in this case. Especial attention should be called to the fact that when the "Leverage Rule" is used, only the numerical values of the known force and of the lever arms of the known and desired forces will be employed. No confusion can result if the sketches referred to are consulted and the known and desired forces are kept clearly in mind.

ADDITIONAL EXAMPLES SOLVED

Consider the brake rigging illustrated in Fig. 2. This form is used on center-entrance cars with a center loading well and maximum-traction trucks. The use of sheaves for connecting the hand brake rigging is necessary here in order to clear the well of the car. Let it be required to find the forces delivered to each of the four brake beams when an 8-in.-diameter brake cylinder and an air pressure of 60 lb. per square inch are employed, the dimensions of the various levers being those indicated in the figure.

The table gives the value of the total force acting on the cylinder push rods as 3,016 lb. Then by applying the leverage rule and considering the middle point of the cylinder live lever I as the fulcrum:

$$\text{Force on rod } B = \frac{3,016 \times 22\tfrac{1}{2}}{18\tfrac{1}{2}} = 3,670 \text{ lb.}$$

As tie rod *B* is connected to the radius bar *C* at its center, the two end forces acting on the lower ends of levers II and III will be one-half that in rod *B* or 1,835 lb. Considering the middle point of the lever II as the fulcrum,

$$\text{Force in rod } D = \frac{1,835 \times 5\tfrac{9}{16}}{3\tfrac{1}{4}} = 3,140 \text{ lb.}$$

To find the force on the brakeshoe *F*, consider the middle point of lever IV as the fulcrum. Then

$$\text{Force on shoe } F = \frac{3,140 \times 3\tfrac{9}{16}}{4} = 2,796 \text{ lb.}$$

Now as the two end forces acting on lever IV are known and as its middle point is connected directly to brakeshoe *H* through a tie rod it follows that

$$\text{Force on shoe } H = 3,140 + 2,796 = 5,936 \text{ lb.}$$

To find the forces delivered to the brakeshoes on the lower wheels of this truck it is necessary merely to consider the middle point of lever III as the fulcrum and then to compute the value of the force acting on rod *E*, which is 3,140 lb., and with the middle point of lever *V* as a fulcrum the force acting on the brakeshoe *G* is found to be 2,796 lb. By adding these values together we find the pressure on shoe *K* as 5,936 lb. Thus the pressure on shoe *F* is seen to be the same as that on shoe *G* and that on shoe *H* is the same as that on shoe *K*.

To find the forces delivered to the brake of the right-hand truck, consider the lower end of the cylinder live lever *I* as the fulcrum. Then

$$\text{Force in rod } L = \frac{3{,}016 \times 41}{18\frac{1}{2}} = 6{,}684 \text{ lb.,}$$

and with upper end of cylinder dead lever *VI* as a fulcrum,

$$\text{Force in rod } M = \frac{6{,}684 \times 22\frac{15}{16}}{41} = 3{,}740 \text{ lb.}$$

The force at each end of the radius bar *N* will then be one-half of 3,740 lb. or 1,870 lb., and

$$\text{Force in rods } O \text{ and } P = \frac{1{,}870 \times 5\frac{9}{16}}{3\frac{1}{4}} = 3{,}200 \text{ lb.}$$

From this we obtain:

$$\text{Force at shoes } R \text{ and } S = \frac{3{,}200 \times 3\frac{9}{16}}{4} = 2{,}850 \text{ lb.}$$

and

$$\text{Force at shoes } T \text{ and } V = 3{,}200 + 2{,}850 = 6{,}050 \text{ lb.}$$

By comparing the corresponding shoe pressures for the two trucks it is seen that they are not the same, those for the right-hand or No. 1 truck being greater. This was found desirable for this car as the car weight for No. 1 end was 440 lb. greater than that for No. 2 end. The reasons for having different shoe pressures for wheels with different weight pressures on the rails will be taken up in another article to appear later under the heading "Percentage of Braking Power."

FORCES IN RIGGING WITH CLASP BRAKES

As an additional example consider the brake rigging illustrated in Fig. 3. This is a common form of "clasp brake" used on heavy electric passenger cars having four-wheel trucks. By "clasp brake" is meant that type of brake in which each wheel is provided with two brakeshoes on opposite sides. Let it be required to find the force delivered to each of the eight brake beams when a 16-in. diameter cylinder and an air pressure of 50 lb. per square inch are employed.

The table gives the total force acting on the push rod as 10,053 lb., then by applying the "Leverage Rule" and considering the middle point of the cylinder live lever *I* as the fulcrum

$$\text{Force on rod } B = \frac{10{,}053 \times 18\frac{7}{8}}{20\frac{1}{8}} = 9{,}434 \text{ lb.}$$

This force in rod *B* acts on the radius bar *C* of the right-hand truck and the force at each end of this radius bar is one-half that in rod *B* or 4,717 lb. and acts on the rods *D* and *E*.

By considering the upper end of lever *II* as the fulcrum, then,

$$\text{Force at lower end of lever } II = \frac{4{,}717 \times 9\frac{11}{16}}{18\frac{1}{2}} = 2{,}470 \text{ lb.}$$

and the force at the brakeshoe *F* is obtained by considering the lower end of lever *VI* as the fulcrum. That is

$$\text{Force at brakeshoe } F = \frac{2{,}470 \times 25\frac{1}{2}}{7\frac{1}{2}} = 8{,}398 \text{ lb.}$$

and

$$\text{Force in rod } H = 8{,}398 - 2{,}470 = 5{,}928 \text{ lb.}$$

The force at the brakeshoe *L* can then be obtained by considering the upper end of lever *VIII* as the fulcrum. That is

$$\text{Force at brakeshoe } L = \frac{5{,}928 \times 20\frac{1}{2}}{14\frac{3}{8}} = 8{,}453 \text{ lb.}$$

Next let us return to the top truck live lever *II*. The force acting at the upper end of this lever and in the tie rod *N* can be found as 4,717 — 2,470 = 2,247 lb., and

$$\text{Force at lower end of lever } IV = \frac{2{,}247 \times 9\frac{1}{4}}{10\frac{3}{4}} = 1{,}985 \text{ lb.}$$

$$\text{Force at brakeshoe } P = \frac{1{,}985 \times 25\frac{1}{2}}{7\frac{1}{2}} = 6{,}749 \text{ lb.}$$

$$\text{Force in rod } R = 6{,}749 - 1{,}985 = 4{,}764 \text{ lb.}$$

$$\text{Force at brakeshoe } T = \frac{4{,}764 \times 20\frac{1}{2}}{14\frac{3}{8}} = 6{,}793 \text{ lb.}$$

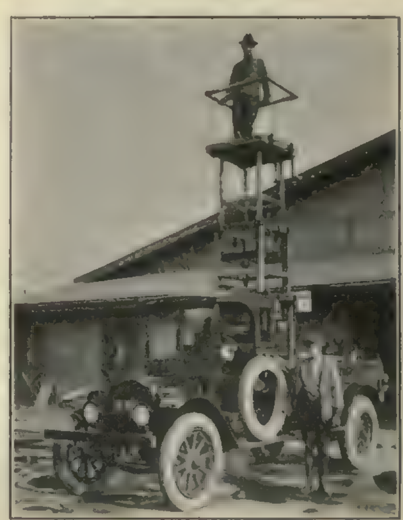
Similarly the shoe pressure for the lower pair of wheels of this truck and for the left-hand truck can be calculated. The dimensions of similarly located levers are the same in all cases so that corresponding pressures will be the same.

It should be noted that the shoe pressure on the trailer wheels is less than on the motor or driver wheels. The reason for this will be fully explained in a following article in which the subject of braking power will be discussed.

The three examples given cover the most common types of electric car brakes. A careful solution of these will give familiarity with the leverage rule and also show that the use of this rule is absolutely unlimited in its scope regardless of the design of the rigging, providing that the three forces acting on the levers concerned are parallel to each other.

New Auto Emergency Truck in Los Angeles

A NEW auto emergency truck with a telescoping tower and a full equipment for handling accidents and traffic blockades has just been put in operation by the Los Angeles (Cal.) Railway. This railway uses several of this type of emergency auto trucks, but the new one is the fastest and most fully equipped of any they have in use.



NEW AUTO EMERGENCY TRUCK

The truck carries a dolly for removing autos which break down on the car tracks and block traffic and also such equipment as hose bridges used at fires, tow lines, fire extinguishers and other complete apparatus for emergency electric car repair. The truck chassis was purchased and the body, tower and much of the equipment were made in the railway company's shops. The truck is of 2-ton capacity.

Cleaning Trucks for Overhaul

Large Lye Vat, Into Which Whole Truck Frames Are Immersed, Makes Repair Work Quicker and More Thorough—It Has Proved Itself Such a Valuable Aid that It Has Paid for the Initial Cost Several Times Over—Workmen Like It, as It Makes Their Work Easier and Cleaner

BY HENRY S. DAY
Equipment Engineer Kansas City (Mo.) Railways

THE idea of cleaning dirty and greasy metal by means of hot lye is not new, but the application of the idea on a large scale has generally been confined to locomotive repair shops on steam roads. Small tanks for cleaning small parts are generally part of the equipment of the average electric railway shop, but what follows has to do with a tank of sufficient capacity to dip a complete truck. This tank has now been in use for about a year and has proved such a valuable aid in the overhauling of trucks that it is believed the details will be interesting to other railway men.

The equipment comprises a watertight steel tank in which the solution is heated by a steam coil, a crane or hoist for moving the trucks and other equipment into and out of the vat, and a basin where the parts can be thoroughly rinsed with clean water in order to remove all lye.

The tank is made of sheet steel $\frac{3}{16}$ in. thick, 14 ft. long, 10 ft. wide and 6 ft. deep and is installed at one side and close to the tracks on which trucks are stripped down for overhauling. The tank is set down in a concrete pit and blocked up on the floor of the pit so that the bottom of the tank pitches toward one corner and with the top of the tank extending 18 in. above the shop floor. At the low corner connection is made to a sewer through a 4-in. pipe fitted with a gate valve. This pipe is given considerable drop to aid drainage when the tank is being cleaned.

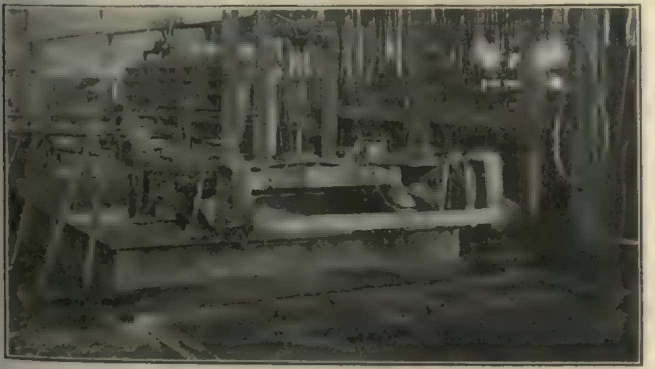
The contents of the tank are steam heated, and for this purpose 280 ft. of 2-in. iron pipe resting on steel cradles laid flat on the bottom was installed. By the use of a number of these cradles, the pipe is sufficiently trussed so that whatever equipment is being cleaned can be let down to rest on the pipes without injuring them. The distance from the bottom of the tank to the top of the pipes is 18 in., which furnishes an ample sediment cellar. The coil in the tank is connected to the boiler, which supplies steam at about 60 lb. pressure, keeping the solution in the vat between 150 and 200 deg. F., which has been found hot enough. At times steam will be given off at the surface, but not in sufficient quantity to bother the workmen in the immediate vicinity or to make it necessary to install a ventilator in the roof over the vat.

LYE VAT IN KANSAS CITY RAILWAY SHOPS SHOWING AIR HOIST, AND GUARD RAIL SECTIONS IN PLACE

The tank holds 45,000 lb. of water, and about 450 lb. of flake caustic gives a 10 per cent solution, which has been found strong enough to clean the average truck in from one to one and one-half hours. In our particular case, this was found to be fast enough, but of course a stronger solution would work faster if this were necessary.

Flake caustic is used in preference to the powdered form because there is no objectionable dust when charging the tank and the cost is about the same.

It was of course necessary to guard against persons falling into the lye, and as a fixed rail would be more or less in the way of the operatives, the guard rail was made of a number of "U" shaped sections of pipe

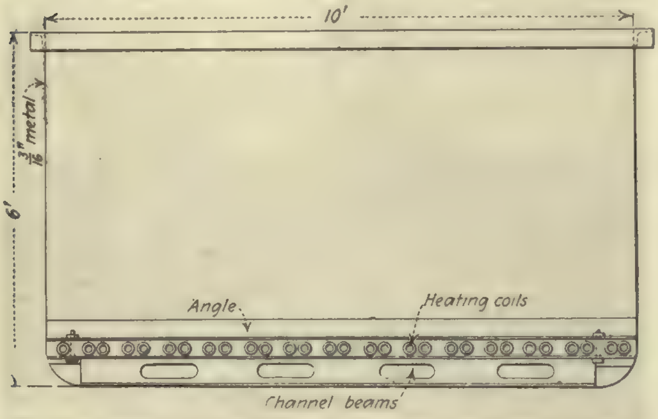

TRUCK LIFTED OUT OF VAT AND PLACED ON BASIN READY FOR RINSING OFF THE LYE

GUARD RAILS REMOVED TO PERMIT READY HANDLING OF TRUCK TO RINSE BASIN SEEN AT THE RIGHT

which are set into pipe sockets in the cement retaining wall. This method gave thorough protection around the edge and at the same time made it easy and quick to remove one or more sections when in the way. The projection of the steel tank 18 in. above the floor level also gave further protection and did not add any interference in lifting heavy bodies out of the solution.

The rinsing stand was installed adjacent to the vat. This consisted of a cement basin 9 ft. x 9 ft., built with the center 8 in. below the edges and connected to an 8-in. drain pipe, the opening into the drain being covered with a steel perforated strainer.

Both the vat and rinse stand are served with a 5-ton crane having an 18 ft. boom equipped with an air hoist. On account of lack of space under the traveling crane serving the truck shop it was necessary to install the lye vat to one side, and it was feared at the start that considerable time would be lost transferring truck frames and other heavy bodies from the traveling crane to the small jib crane, but this has not proved the case.



CROSS-SECTION OF TANK SHOWING SUPPORTS FOR HEATING COILS IN THE BOTTOM

Trucks due for overhaul are run in on the repair track, which is next to the vat. After the gear pans and motors are removed, the frames are lifted from the wheels by the traveling crane and dropped within reach of the lye vat crane. Without the making of any attempt to remove any dirt, grease or oil, the whole frame is lowered into the lye and allowed to remain from one to two hours. It is then transferred to the rinse stand and washed off with a hose. During the stay in the vat the metal becomes the same temperature as the water and is hot enough, when it comes out, to dry off the rinse water, so that the truck frame is turned over to the repair man with steel clean and perfectly dry.

Immediately after a truck is received from the rinse stand, an inspector examines it and quickly and easily finds small cracks or fractures that have just started which would probably have been missed had the truck not been washed. These he marks with chalk and a portable welding outfit follows him and makes repairs. Loose bolts and rivets are also much more easily found. It is at this point that a very considerable saving in time takes place in the reassembly and in making repairs. Repairmen looking for worn or loose parts find them quickly, and wrenches stay where they are placed without slipping off. Parts sent to the machine shop are ready to work on without first scraping or cleaning away oil and dirt.

By actual comparison it has been found that a truck that has been through the lye vat is assembled in from 10 to 15 per cent less time than one that has not. Before the lye vat was installed it was the method, after a truck was overhauled, to have one workman with a scraper and stiff brush clean the truck and then paint it. This required about one day's time and a gallon to a gallon and a half of paint, for the dirt that could not be removed soaked up most of the paint. With the cleaned truck, 2 quarts of paint cover the truck liberally, and by applying with a small hand air sprayer fifteen minutes is ample time and the truck is thoroughly and evenly painted.

Since the installation of the lye vat in January, 1920, some 700 or 800 trucks have been washed, besides many thousand smaller parts, such as motor frames, housings, journal boxes, air compressors, etc. Air compressors and parts of like weight are let down into the solution by the hoist and secured to the edge of the tank or pipe rail by a locating chain. Smaller parts are placed in steel baskets. All dirty scrap brass and copper is also washed, eventually saving much time in sorting and grading.

The vat is operated by one laborer, who devotes most of his time to its operation, but when not so occupied he is used on the truck floor.

As a rule, the truck floor in most shops is the dirtiest place in the shop, but with a lye vat this is not so. Most of the dirt and grease goes into the vat and there are practically no slop and no fumes at all. A certain amount of evaporation takes place, but the addition of water keeps the solution at the desired level. This particular vat was operated from January to June without replenishing the caustic and the tank has been cleaned out only twice in one year. This was done by opening the gate valve, allowing the solution to run into the sewer and running clear water through the tank until all sediment had disappeared.

A feature that has been of no little value is that the workmen like it as it makes their work easier and cleaner, and there has never been any of the criticism that generally goes with equipment which is admittedly installed to speed up production.

There are, of course, a number of ways of building a tank of this kind and the writer has had experience with a vat that was merely a cement basin let into the floor, but believes the steel tank is better. It is also desirable, if possible, to place the tank under the same crane that serves the truck floor, but as already stated the present installation could not be arranged in that manner, though it is giving excellent results and has already paid for the initial cost several times over.

Adjustable Winding Machine

THE Comstock Manufacturing Company, Wilkes-Barre, Pa., is placing on the market an adjustable head winding machine having three speeds. It is driven through a cone friction clutch and worm gear and is controlled with a foot lever. Either right or left-hand winding can be taken care of, as the machine has a face plate on each end of the shaft.

Another product of the company is an adjustable armature coil press which can be used for either hot or cold coil pressing. Either gas or steam heat can be used for hot pressing and the coil is pressed with one movement of a cam lever. The amount of pressure secured can be adjusted by nuts on hook bolts. The platens on the press are adjustable to suit any coil up to ⅞ in. square. Extra platens are used when different lengths of coils are to be pressed.

Equipment and Its Maintenance

Short Descriptions of Tools Used Together with Mechanical and Electrical Practices of All Departments to Supplement the Preceding Longer Articles

Steel Trolley Shortens Trolley Wheel Life

Experience of the Louisville (Ky.) Railway with 9,400 Ft. of Steel Wire Which Was Installed in the Fall of 1913 Is Not Satisfactory

By Frank H. Miller
Vice-President in Charge of Engineering Louisville (Ky.) Railway

In 1913 the Louisville Railway had occasion to renew a section of 9,400 ft. of trolley wire on Fourth Avenue, which is one of the main residential streets of the city. For this purpose round steel trolley wire, size No. 000, was purchased and installed in the fall of that year.

The cost of this steel wire at that time was 6.5 cents, while the cost of hard-drawn copper was 16 cents a pound, delivered in Louisville. The construction used was of the ordinary span-wire type on wood poles with 100-ft. spacing and making use of 12-in. clinch ears. The 9,400-ft. section on which the steel wire was erected is in the middle of the line in question. The daily mileage over this steel wire is 1,030 motor car-miles, while the daily mileage over the entire Fourth Avenue route is 3,558 motor car-miles. The trail car mileage on Fourth Avenue amounts to 400 a day. The steel trolley wire is paralleled by a 1,000,000 circ.mil feeder cable with feed taps every 1,000 ft., so that the question of conductivity was a negligible consideration.

This line loops through the business section of Louisville and extends out into the residential district. The downtown end is equipped with Phono electric trolley, the center section with the steel wire and the suburban end, which branches and extends about 3.5 miles outside the city limits by two separate routes to a public park, is equipped with copper trolley. The life of trolley wheels on this southern or suburban section of the line is considerably less than the average mileage in the city, due to the high speed, exposure to sleet and greater proportion of trailers run.

The experience of this company with the steel wire is indicated by the two tabulations printed herewith. In the following table is shown the average mileage obtained from 6-in. trolley wheels during the years 1916 to 1920. The first five items in the table show the average mileage on five representative lines, while the sixth item shows the average mileage obtained from the combined figures of the twelve city lines. These averages are compared with that obtained on the Fourth Avenue line with its 9,400-ft. section of steel overhead, from which it is seen that the average mileage per trolley wheel is some 4,300 miles less than the average for the entire system.

TABLE I—MILEAGE OBTAINED FROM 6-IN. TROLLEY WHEELS

	Miles
Line A	9,202
Line B	11,323
Line C	11,964
Line D	13,559
Line E	16,786
Average for twelve city lines, including Fourth Avenue	13,053
Fourth Avenue Line	8,766

In the other tabulation is shown the amount of wear that has taken place on the steel wire itself, as indicated by micrometer readings made recently, the ears having been removed to take the measurements. The measurements indicate the amount of wear after seven years' service of the density noted above. Corresponding with each figure given is a symbol denoting whether the trolley wheel was usually taking power or coasting at the various locations named.

There have been only two breaks in this steel trolley wire during its life. One of these occurred during excessively cold weather in January, 1918, when the temperature was 15 deg. F., and the other occurred in January, 1920, from unknown cause.

The steel wire causes a brownish rusty deposit on

TABLE II—WEAR ON STEEL TROLLEY WIRE IN LOUISVILLE, KY.
(Diameter New 0.412 In.)

Location		Horizontal Diameter	Vertical Diameter	— Under Ear — H. Dia.	V. Dia.	Remarks
S. B. wire 100 ft. S. Broadway	P	0.367	0.359	0.393	0.298	
N. B. wire, 100 ft. S. Broadway	C	0.387	0.373	0.407	0.389	Wire bright on top and sides
S. B. wire 100 ft. N. Breckinridge	C	0.385	0.371	0.412	0.389	
N. B. wire 100 ft. N. Breckinridge	P	0.387	0.367	0.370	0.271	
S. B. wire 150 ft. S. Breckinridge	P	0.335	0.307	0.331	0.307	
N. B. wire 150 ft. N. Breckinridge	P	0.367	0.348	0.403	0.324	
S. B. wire 100 ft. S. Kentucky	P	0.317	0.264	0.338	..248	
N. B. wire 100 ft. S. Kentucky	C	0.361	0.343	.....	.....	
S. B. wire 250 ft. N. Oak	C	0.327	0.271	.....	.....	
N. B. wire 250 ft. N. Oak	P	0.325	0.272	0.403	0.299	
S. B. wire half way between Oak and Ormsby	P	0.377	0.306	.....	.....	Center of span
N. B. wire half way between Oak and Ormsby	P	0.350	0.301	.....	.....	Center of span
S. B. wire N. S. of Magnolia	P	0.334	0.255	0.267	0.212	Worn badly.
N. B. wire N. S. of Magnolia	P	0.337	0.277	.....	.....	Splice here.
S. B. wire 100 ft. S. of Magnolia	P	0.349	0.305	.....	.....	
N. B. wire 100 ft. S. of Magnolia	C	0.357	0.316	0.409	0.365	Wire bright top and sides.
S. B. wire 50 ft. south of railroad crossing a street	P	0.340	0.288	.....	.....	Center of span.
N. B. wire over railroad crossing a street	C	0.331	0.264	.....	.....	Center of span.
S. B. wire 100 ft. North of Avery	C	0.375	0.342	.....	.....	
N. B. wire 100 ft. North of Avery	C	0.381	0.360	.....	.....	

P Indicates probability trolley wheel taking power at location indicated.
C Indicates probability trolley wheel coasting at location indicated.

the roofs of the cars and at night a line of fire follows the trolley wheel when it is taking power from the wire.

These considerations, including the shortening of the life of the trolley wheels, have led to the decision that when this wire is renewed, which we now expect will be in the fall of 1921, it will not be renewed with steel wire.

Labor-Saving Devices in the Way Department*

An Outline of the Ways in Which Costs Can Be Kept Down in Track and Paving Work, Together with Data as to Actual Saving Which Has Been Accomplished

By CHARLES H. CLARK
Engineer Maintenance of Way the Cleveland (Ohio) Railway

ONE of the first machines a railway should purchase is a derrick. In a maintenance department yard a mast derrick is, of course, the cheapest. A derrick with a 25-ft. boom, mounted on a car, will handle 60-ft. rails, a ⅝-yd. clamshell and pieces up to 5 tons in weight.

The Cleveland Railway has two derricks of the above-mentioned type and also a 60-ft. mast derrick with a 70-ft. boom and a stiff-leg derrick with a 70-ft. boom. The last-named derrick operates on a special track 800 ft. long and is used to pile sand, coal, rails, special trackwork, cinders, etc. The same railway also has a 60-ft. hammerhead, full-swing, gantry derrick operating on a special track 800 ft. long. This carries a 2½-yd. Lakewood bucket and covers two unloading spaces 50 ft. wide and 800 ft. long. By its use a carload of coal can be unloaded in twenty minutes. The company also has a locomotive crane, standard gage, with a 50-ft. boom, which can be used on any track in the yard where there are no overhead wires. To facilitate the use of this crane all wires are carried in a protected trough alongside the track.

A derrick with a 50-ft. boom can be used to pile material high, saving trackage and yard space. Granite blocks on our property are sometimes piled 25 ft. high, which could never be done by hand.

Another useful device on an electric railway property is a stone crusher, which will save tons of old stone otherwise useless. Old paving stone can be crushed for from 40 to 50 cents per yard. In normal times crushed stone would cost $1.25 to $1.50 per yard. A crusher also saves the expense of hauling crushed stone to a dump and unloading it.

There are further opportunities for saving in connection with cement. Cement bags as dumped at the mixer usually contain some cement, which we save by means of a bag cleaner which we constructed. A test showed that 1,000 bags weighed before cleaning 1,313 lb. After cleaning they weighed 606 lb., so that we saved 707 lb. of cement and the freight on this weight of bags shipped back to the mill. The saving in freight more than paid for the cleaning. We also lessened the expense of piling cement in the storehouse by the use of a belt conveyor and electric trucks.

Sand driers are a source of expense to a large road. We have used a large rotary drier for about seven years, and with it two men can dry from 100 to 150 tons of sand per day. On the Cleveland Railway we also use a portable sawmill on a flat car for sawing up old ties into blocks used for blocking up tracks and also for emergency heating purposes.

SOME NOTES ON TRACK CONSTRUCTION

In the design of structure for car tracks economies are possible. With solid concrete construction, steel ties embedded in concrete are less expensive than wooden ties with tie plates. With the former there is less excavation and less concrete. For construction work temporary tracks can be laid on the sides of the street where there is sufficient room. Eighty-pound T-rail can be laid on the pavement on 1½-in. boards, with tie rods and gas-pipe spreaders to maintain gage.

In Cleveland most of the trackwork consists in relaying tracks, involving the taking up of the pavement. This we do with a pavement plow which will loosen 7,000 sq.ft. in three minutes. Concrete track foundation also has to be broken up. Instead of using picks, hammers and bars as formerly, we now break it up with a special machine that will do the work of 100 men. After breaking out the foundation, we cut up the old rails with an oxyacetylene torch, with which two men can cut more rails than can twenty working with chisels.

COSTS OF TRACK LABOR AND MATERIAL, CLEVELAND RAILWAY, 1914 TO 1921

Date	Rate per Hour	Labor Applied	Material	Total
Jan. 1 1914	$0 19	$1 35	$2.49	$3 84
Jan. 1 1915	19	1.12	2 70	3 82
April 1 1915	22½	....	....	....
Feb. 1, 1916	.25	1 47	2 64	4 11
April 1, 1916	27½	....	....	....
April 1, 1917	30	1.85	3 14	4 99
June 1, 1917	.32½	....	....	....
Aug. 1, 1917	35			
July 1, 1918	.42½	1.95	3 72	5 67
Jan. 1, 1919	42½	2.21	3.88	6 09
Jan. 1, 1920	[illegible]	2.24	4 56	6 80
Jan. 1, 1921	40	.....	....	....

In excavating, the electric shovel can be used where space is available. In Cleveland, after the excavation is complete, the rails are laid on the ties, the old material is hauled away in work trains and new material, such as gravel, crushed stone, sand, cement, etc., is brought in. The joints are then riveted with a pneumatic riveter, which heats rivets under 100-ton pressure and can drive eight of them in less than four minutes. The tops and bottoms of the plates are then electrically welded with a machine specially designed for seam welding. Most of the reaming and drilling is done with "Chicago Pneumatic" track-drilling machines. High-speed steel is used in all drills and reamers. Two men with one of these machines can do the work of ten with hand ratchets.

When the track is ready for concreting, the concrete mixer comes into play. We first used these mounted on wheels alongside the track, but now we have them mounted on car wheels with a distributing boom 30 ft. long. We formerly required twenty-four men to run and feed the mixer, but now use only eleven. We have also increased the number of batches mixed per day by 20 per cent by the use of a loading device attached to a 30-ft. conveyor.

We have not as yet been able to pave with anything but concrete with a machine, but are using with good success grouting machines made by the Lakewood Engineering Company. Another great labor saver is an automatic dump car, the top of which is only 5 ft. 3 in. above the rail. It will hold 18 cu.yd., can be loaded by hand and requires no assistance in unloading.

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*Abstract of paper presented before joint convention of Illinois Gas Association, Illinois State Electric Association and Illinois Electric Railway Association, held at Chicago, Ill., March 15 and 16, 1921.

Finally, I wish to call attention to a small item in labor-saving devices, but an important one, the common dirt shovel. We buy the best chrome-nickel steel shovel we can find. While these cost twice as much as the common ones, they last four times as long and do not wear down to a small spoon-like tool. We use an identification mark of three holes drilled in the blade.

The accompanying table shows what labor-saving devices have accomplished with us since 1914. Then we were paying a base rate of 19 cents per hour; track labor cost $1.35 per foot and material $2.49. These prices do not include [illegible] the [illegible] or paving material. Since then the cost of labor and material has advanced greatly. Wages per hour have increased 163 per cent, while total labor has increased only 64 per cent. Material costs have increased 78 per cent.

Automatic Electric Car Coupler

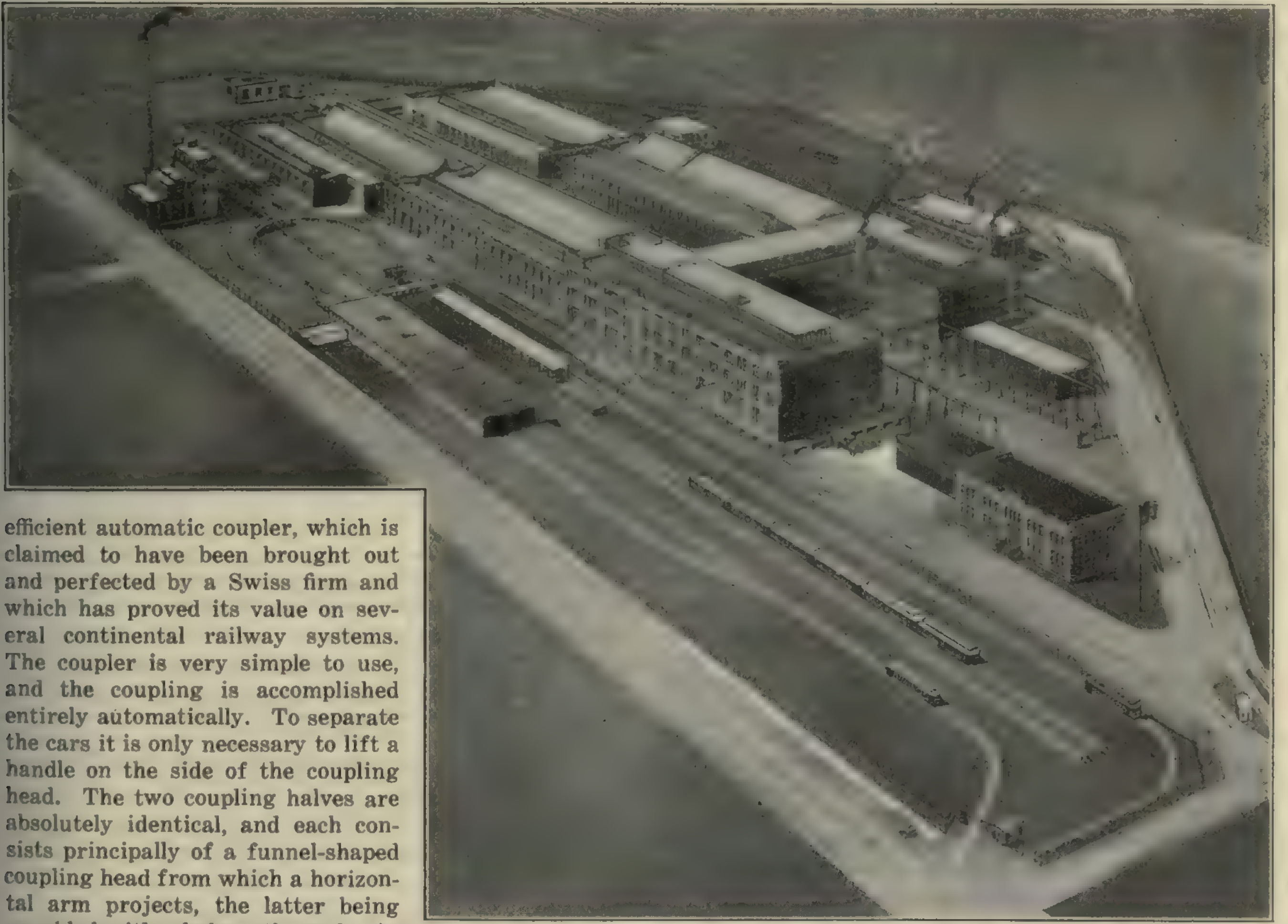
THE adoption of the plan of coupling together motor cars and the successful use of trail cars on several of the tramway systems in Great Britain, says the *Electric Railway & Tramway Journal*, has directed particular interest toward the subject of a really practical and efficient automatic coupler, which is claimed to have been brought out and perfected by a Swiss firm and which has proved its value on several continental railway systems. The coupler is very simple to use, and the coupling is accomplished entirely automatically. To separate the cars it is only necessary to lift a handle on the side of the coupling head. The two coupling halves are absolutely identical, and each consists principally of a funnel-shaped coupling head from which a horizontal arm projects, the latter being provided with a hole at the end. At the narrow end of the coupling head is a locking device, the principal part of which is the coupling bolt. The automatic coupling is provided with a boss on the side of the coupling head, on which the cables for the electric brakes can be fixed if required. The coupling head is attached to the car, just as in the old type coupling, by means of a rod provided with draw and buffer gear.

New Shops for Boston

Boston Elevated Railway Plans to Spend $5,000,000 for the Construction of a New Consolidated Set of Shops if the Massachusetts Legislature Will Lend State's Credit

THE trustees of the Boston Elevated Railway have just made public plans for the construction of a new consolidated set of shops at Everett, at a cost of nearly $5,000,000, and the entire abandonment of the several antiquated and scattered shops which have been in service for the last thirty or more years. This announcement was made by Edward Dana, general manager for the trustees, at a hearing before the committee on street railways of the Massachusetts Legislature, which has under consideration a bill lending the State's credit to the company.

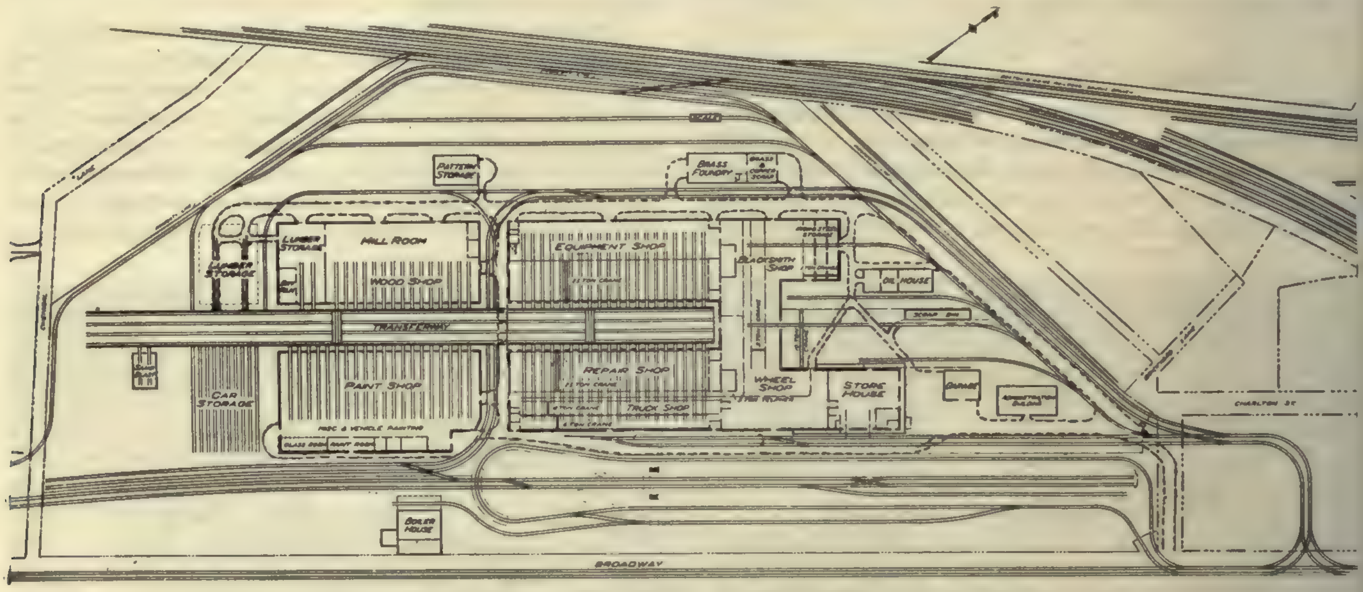
The general layout and type of construction proposed for the new Everett shops is best illustrated by the accompanying photographs of the plans which the officials of the Boston Elevated Railway submitted to the Legislature. It is proposed to handle all repairs, except such minor ones as are always done at carhouses, in the new shops, including rapid transit as well as surface cars. The location chosen is at the Everett terminal of the elevated line, about one mile north of Sullivan Square.



PERSPECTIVE VIEW OF SHOP PROPOSED BY BOSTON ELEVATED RAILWAY TO COST $5,000,000

The necessity for a complete new shop layout has been apparent to the elevated officials for a number of years, but owing to the severe financial conditions they were unable to proceed along the desired lines.

The present shops of the company were frankly characterized as "inadequate and inefficient" by Edward Dana when addressing the members of the Legislature on the subject. Moreover, the present shops, at Albany Street, Bartlett Street and Sullivan Square, are several miles apart, necessitating a divison of supervisory forces and a duplication of shop equipment and storeroom supplies. The Bartlett Street shop was originally used for horse-car repairs, and has been continued to the present day with only minor changes and repairs. The Albany Street shop is nearly as old. Lighting and other working conditions affecting shop employees are so bad as to have a very evident effect on production. The Elevated officials submitted a number of photographs with their report, illustrating the almost unbelievable congestion of machinery and facilities existing at the present time.



THIS IS A PLAN OF THE PROPOSED SHOPS OF THE BOSTON ELEVATED RAILWAY

The estimated cost of the new Everett shops is approximately $5,000,000 at present prices, but to offset this proposed expenditure savings are estimated aggregating $708,850 per annum. It is also expected that prices will be materially reduced before the final consummation of these plans.

Nearly one-half the estimated annual saving is based on the expected reduction in the number of cars out of service at any one time and the shorter time that will be necessary to hold each car out of service for repairs or overhauling, due to the greater rapidity with which work can be conducted. It is figured that this will be equivalent to a gain of 100 cars at an average value of $12,000 each. By means of the higher standard of maintenance that will be possible under the new conditions it is believed that a 50 per cent reduction will be made in the number of car failures, with a great resultant saving in lost time of crews, pull-in mileage, loss of fares and other items. The total savings on account of these conditions is figured at $332,500 per year.

The balance of the anticipated economies is as shown in the accompanying table.

It is believed by the management that the estimate of 10 per cent saving due to greater efficiency of labor under better working conditions is conservative. Attention is called to the fact that the present shops, particularly at Bartlett Street, are very poorly lighted, a great deal of the work being done by artificial light, in many cases portable electric lights being used. On account of the limited space available for repairs it is necessary to put various classes of workmen together on one car in order to get the car in order as soon as possible, which means that frequently carpenters, pipe fitters, wiremen and painters will be found at work around the same car. In some cases the tracks in present shops are on 10 ft. 6 in. centers, with numerous wooden columns in between. As the present large types of cars are 8 ft. 8¾ in. wide this leaves only a few inches between the building column [illegible] side of the car.

The plans have been made on the basis of providing at the present time facilities adequate for the next ten years, with arrangements so that future extensions after that time can be made as required without disarranging or interfering with the routine work of the shops.

The buildings are to be of a modern fire-proof type of construction, provided with every up-to-date safety and labor-saving device, as well as appliances and facilities for the convenience and comfort of employees.

ANTICIPATED ECONOMIES TO BE EFFECTED IN THE NEW SHOPS AT BOSTON

Increase in efficiency of labor due to better working conditions, estimated 10 per cent	$200,000
More efficient separation and specialization of work	30,000
More efficient supervision	16,000
Labor-saving machinery and handling equipment	25,000
Reduction of hauling materials between shops	30,000
Consolidation of work on new equipment	12,000
Consolidation of stores	7,000
Reduction of force by consolidation of machine shops	12,000
Reduction of force by consolidation of truck shops	6,000
Reduced cost of heating	2,000
Reduced fire hazard and insurance	10,000
Reduction miscellaneous labor, watchmen, messengers	7,000
Rentals eliminated on Goodyear Building	15,000
More economical handling of lubricating, fuel oil	4,350

The general plans are the result of long and detailed studies by the management. As long ago as 1916 the site for the shops was chosen and since then the plans have been under way. Much of the planning has been done by John Lindall, superintendent of equipment. Many of the largest and most modern shops of steam and electric railways have been visited, and consideration has also been given to the best developments in car-building plants and automobile factories.

Comments on Reducing Shop Costs*

Shops and Shop Organizations, Responsible for a Large Share of the Operating Costs, Should Be Thoroughly Looked Into to See How They Can Contribute to the Reduction of Expenditures

BY J. M. BOSENBURY
Superintendent Motive Power and Equipment Illinois Traction System, Peoria, Ill.

MUCH talk is indulged in nowadays about the serious financial and physical condition of the electric railways throughout the country and all are agreed that something must be done to save the industries from a calamity that has seemed inevitable. Therefore, it behooves all persons engaged in the business to study thoroughly their particular branch of it and see what they can contribute to bring about a change for the better.

Gross revenues have been good, but the appalling increase in operating expenses has dwindled the net down to, and in some instances beyond, the disappearing point. As the shops and shop organizations which maintain the cars and equipment of electric railways are responsible for a large portion of the operating expenses, it is well to look thoroughly into existing shop organizations to see what they can contribute toward reducing their expenditures.

This subject is a difficult problem to deal with in a general way because of the vast difference in the size of shops, which range all the way from the larger city shops with millions of dollars invested in real estate, buildings, machinery and equipment, employing many hundreds of men, handling hundreds of cars each day and expending millions of dollars per annum, down to the modest little shed without machinery or equipment, employing two or three men and handling two or three cars per day. But since all shops of whatever size are working to the same end, which is proper maintenance of cars and equipment at a minimum cost, any helpful suggestions that can be made will in a measure be applicable to all concerned.

WAR BROUGHT MANY TROUBLES

As is the case with many other industries, war conditions brought about most of the electric railway shops' troubles by attracting steady, satisfied, skilled mechanics and foremen to other lines of employment at unprecedentedly high wages and less exacting requirements. The war period also led to greatly increased prices for raw materials and manufactured repair parts necessary for the maintenance of cars and equipment.

A large number of the industries thus affected have been able to close down their shops and wait for better conditions, but the electric railway shop must keep on working at all hazards without stopping even for a single day.

It is true that war work long since ceased and the men formerly engaged therein have had to return to their old places or seek new ones, but these men have not forgotten their high wages and the easy times they enjoyed nor are they content to adjust themselves to present-day conditions and requirements without a struggle. This phase of the situation is quite easily observed by making a tour of inspection of shops and listening to the conversations that casually drift to one's ears. It is quite evident that some of the contributing causes of expensive shop work entering into the high costs of maintenance of cars and equipment are: Large labor turn-over, causing small output per man-hour, and incompetent men, due to lack of proper training and sometimes due to physical incompetency. There are even those who are wilfully incompetent and whose sole object is to do as little as possible and still stay on the job. Again we find men working under the handicap of not having been properly informed of the task before them. In other instances we find slow progress being made on account of workmen attempting to use improper materials or on account of the lack of spare parts, which entails much more time to do the task at a greater expense than if proper materials were available.

In an effort to better these conditions, it will be well for the chief executives of shops to investigate thoroughly the various heads of departments, supervisors and foremen to whom is intrusted the detail planning of the work as well as the supervision of the workmen and also the training of new men who enter their employ with the idea in mind of ascertaining their fitness for the duties intrusted to them. For example: A man may be a good supervisor but a poor workman, or he may be a poor supervisor and a good workman. Again, he may be both a good supervisor and a good workman, and yet be unable to impart his knowledge to others in a manner that will bring about the best results.

COMPETENT FOREMEN ARE SCARCE

Competent supervisors and foremen can, to a certain extent, overcome the effect of inefficient workmen, but such men seem to be scarce at the present time. Supervisors and foremen need training and preparation for their positions as well as the workmen who go through their apprenticeship courses to become competent mechanics.

The selection of supervisors and foremen should receive serious consideration. They should be men whose personal records of past performances as workmen warrant their promotion, after which they should be trained and tried out at the same time by placing them temporarily in authoritative positions in the absence of the regular incumbents, which gives them an opportunity of being instructed and coached in the duties of supervising and managing by those whose positions they fill temporarily. Then if they have ambition, ability and loyalty, they will soon demonstrate their qualification. If they do not qualify, they can be returned to the ranks without complications.

Hence, the supervisors selected to do the detail planning of the work, direct the workmen and train men for shop work should be those who are best qualified for and adapted to that particular position. That is, they should be competent to plan and execute, they should be men who understand the human machine, as well as the mechanical machine, and they should be able to impart their knowledge to others. They should have a real interest in the company and the company employees under their charge. Once an employee has been placed under their charge, the supervisors should be able to bring about a state of mind in that man that will induce him to give the company the best there is in him.

In order to enthuse workmen, it should be pointed out to them that the electric railway is not a passing industry, as many people would have them believe. Electric urban and interurban transportation will be with us for a long time to come and there is a future and not far distant time when steam railways must electrify, so that men now being employed or new men who will be employed in electric railway shops will have as much of a future ahead of them as in any other industry. It should be pointed out to them that many of the present executives came up from the ranks and there are opportunities for others.

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*Abstract of paper presented before Illinois Electric Railway Association in Chicago, March 16, 1921.

As the electric railway shop is one of the few industries that offer year-round employment for the men, with good working conditions and good compensation, the difficulties experienced in the last few years should begin to disappear and the electric railway shops should be able to attract and train good men into an organization that will compete favorably with many other industries in getting results at a minimum cost.

The same causes which were responsible for labor conditions up until a short time ago were also responsible for the shortage of material with which to make proper repairs and also for the excessive cost of same, but now that these conditions are fast disappearing, the shop executive has an opportunity thoroughly to overhaul his shop organization and get his equipment and maintenance cost down to a reasonable level.

MAINTENANCE COSTS UNDULY HIGH

In this connection, it may be well to state that in examining a large number of operating statements and comparing department costs, the cost of maintenance of equipment in a great many instances has increased in percentage more than any other department.

While war conditions did a great amount of harm to electric railway shops and organizations, they also brought about many new things that can be used advantageously in the industries. New materials were developed, old materials were improved, new processes were worked out and proved a success, new factories with improved machinery were constructed, and in many instances these industries, materials, developments and machinery are waiting for some one to come along and use them, and it is certain that in connection with the maintenance of cars and equipment there is room for improvement in materials now in use, and room for improvement in the processes of their manufacture, all tending to a reduction in cost and increase in life.

Maintenance of equipment in many instances has been held down to running repairs for so long that at the present time much work must be done and much material used to bring the equipment back to its normal condition. A company is judged more by the cars it operates, which are before the eyes of the public every minute of the day, than by any other thing. The electric railway shops and their organizations can be a big factor in bringing about better conditions all around by overhauling their equipment, making it safe, sightly and comfortable.

Inspection of equipment at regular intervals, usually on a mileage basis, when carried out systematically, is one of the biggest factors in preventing breakdowns in service, pull-ins, heavy repairs and high maintenance costs.

Of course, while inspection is being made, running or minor repairs should be made, all movable contacts should be cleaned, trolleys put in order and all bearings properly lubricated. In fact, the inspection should be so thorough and done by such competent men that after the car is turned out there is reasonable assurance it will run until the next inspection date without failure in service.

The electric railway car is the only piece of equipment of a highly complicated character that is operated by a man who has no interest in it excepting starting and stopping it, while another man has charge of the maintenance of the car and is held responsible at all times for its proper performance, and is the one censored in case of failure in service. Therefore, this person should lay down a comprehensive inspection schedule and get cars in at the proper time and by so doing cut repair bills to a minimum.

Chicago Brightens Up

Dark Green Color of Cars Gives Way to Red and Cream—Brighter Color Makes Cars Look Bigger and Also Should Reduce Accidents from Collision

CHICAGOANS have recently been startled by the appearance on the street of bright yellow and red street cars. The stay-at-homes thought a car from some strange parts was lost in Chicago, while the gadders thought they were in some other city. For since 1907 Chicago street cars have been painted a very somber green and it has been a very satisfactory color from the maintenance standpoint.

HOW NEWLY PAINTED RED AND CREAM CHICAGO CAR APPEARS TO THE CAMERA

The new management, however, decided, after rather extended investigation and trials of various colors and combinations, to repaint all cars red up to the window rail and with a cream color for the superstructure, except for a red drip rail.

There were several reasons for the change. One was purely the psychological effect on the public, both as an indication of a new management and because the brighter color gives the impression of more cars. The bright yellow taxicabs for which Chicago is famous demonstrated this theory. The bright paint makes the cars look bigger and more numerous. Furthermore, the visibility of the colors selected is an important factor in avoiding collisions. The dark green color has a low visibility and several accidents have been traced directly to this fact. The maintenance of the yellow and red, particularly the former, will probably be slightly more expensive than the old green hue, but the other advantages will offset this, it is felt. At present the cars are being put through on the regular overhauling and painting schedule of about eighteen cars a week, but this will probably be increased to about thirty a week shortly. At the time of this writing about 100 of the repainted cars are on the streets. The accompanying picture of one of the newly painted cars shows the reaction of the new colors on the photographic plate.

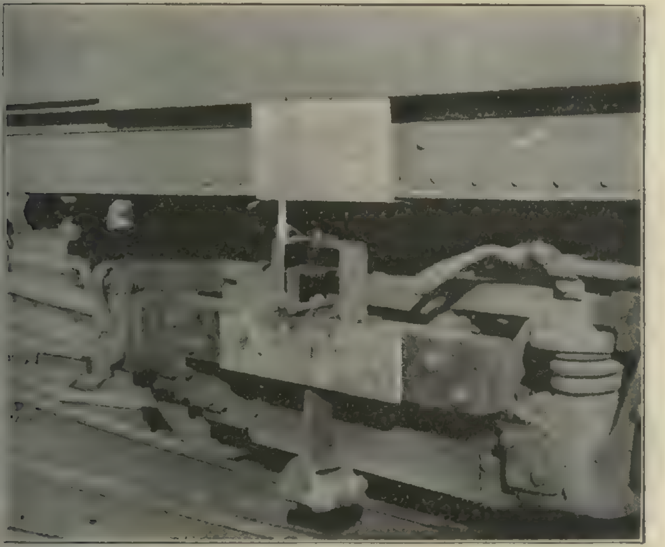
Third Rail Gaging Device

Variations of Third Rail from Its Correct Elevation Under Service Conditions Quickly Obtained by a Device Mounted on Car—Complete Survey of 180 Miles of Track in Fifteen Hours

BY W. A. BURNHAM
Assistant Superintendent Shops and Equipment Chicago Elevated Railways

IN CONNECTION with maintenance work, the Chicago Elevated Railways recently found it desirable to develop an indicating gage which would show the height of the third rail relative to the running rails under service conditions. On the elevated system the third rail insulators are mounted on the ends of the same ties that support the track rails and the proper position of the third rail is 6½ in. above the top of the running rail.

It was believed that the weight of passing cars might be causing a considerable variation in the difference in elevation of running rail and power rail, perhaps furnishing an explanation for some breakages of the current collecting shoes and sleet removing devices attached to the car trucks. Accordingly, a car was fitted with two indicating gages, as shown in the accompanying illustrations, and properly pivoted to make a correct indication on the curves. This device consists of a fixed brass tube attached to the truck below all springs, to represent the position of the track rail, and a round steel-end rod sliding inside the brass tube and fixed at its lower end to a hardened steel roller which bears on the top of the third rail and indicates its height.



THIRD RAIL ELEVATION GAGING DEVICE INSTALLED ON CHICAGO "L" CAR

With the roller set a standard distance of 6½ in. above the top of the running rail, a zero mark was made on the fixed tube and sliding rod, just outside one of the car windows. A scale reading in inches both ways from this zero mark on the fixed tube then indicated directly to observers inside the car, as it was operated along the track, whether the third rail was higher or lower than the standard setting and how much. Further to simulate service conditions scrap iron was placed in the car to represent passenger load.

With a car fitted with two such devices, one on each side, a complete survey of all third rail on 180 miles of track was made in fifteen hours. The survey furnished exact information of the conditions of the power rail relative to the third rail shoe under service conditions. It was found that the movement of the rail and tie under certain track conditions materially increased the relative height of the third rail with respect to the running rails and was the cause of some of the breakage of contact shoes.

Maintaining Ball Bearings

Some Data for the Life and Cost of Maintaining Ball Bearings on GE-258 Motors Show that They Are Cheaper to Maintain than a Sleeve Type and Their Life Is Generally Satisfactory

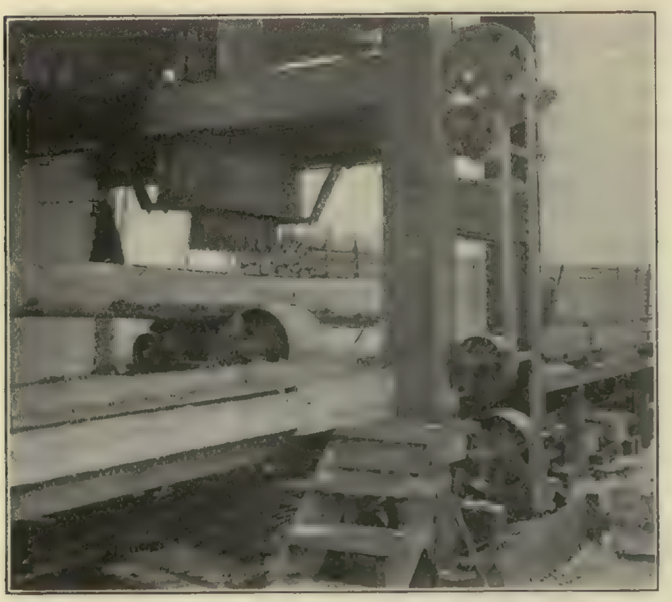
BY H. E. KROUSE
Master Mechanic Trenton & Mercer County Traction Corporation, Trenton, N. J.

SINCE the advent of the GE-258 motor in connection with safety car equipment, questions regarding the service obtained and the cost of maintaining the ball bearings in this motor have been frequently asked. Results of several years' experience in maintaining this type of motor have led me to believe that ball bearings are ideal for this type of motor. An analysis of results obtained shows that they are cheaper to maintain than sleeve bearings and that their life is generally satisfactory. These conclusions are drawn from results obtained in continuous service on 19-ton cars for more than three years and on Birney safety cars for more than two years.

The life of any type of motor bearing depends to a great extent on lubrication and cleanliness. The ball bearing is better protected than the sleeve bearing and is less liable to have foreign substances mixed with the lubricant. One of the greatest economies in connection with the maintenance of ball bearings is found in the fact that it requires only a small amount of lubricating grease to keep them properly lubricated. We have been lubricating our ball bearings but once for every 6,000 to 7,000 car-miles, or where lubrication is done on a stated period rather than a mileage basis about once in every ten to twelve weeks. During the last ten months the lubrication of the ball bearings on 160 GE-258 motors has cost us on an average of but $15 a month for both lubricant and labor. During this period we have not had a single bearing failure. A few pinion end bearings have been removed for defective balls, after having made an average of 140,000 car-miles. These bearings were removed during the overhauling of motors which had been in constant service for three years.

The majority of these bearings, however, were found to be in good operating condition, which led us to believe that the average life of the pinion end bearings on initial installations should exceed 175,000 car-miles and the commutator end bearings should average at least 250,000 car-miles with proper care and favorable conditions.

Our lubrication is done with a fool-proof grease gun which has a capacity of 2 gal. of grease and which is very positive in its action. This large capacity is desirable, as it makes reloading of the gun unnecessary while lubricating from fifteen to twenty cars each having two motors. The type of gun which we use is manufactured in several sizes by the Runyen Manufacturing Company of Grand Rapids, Mich.



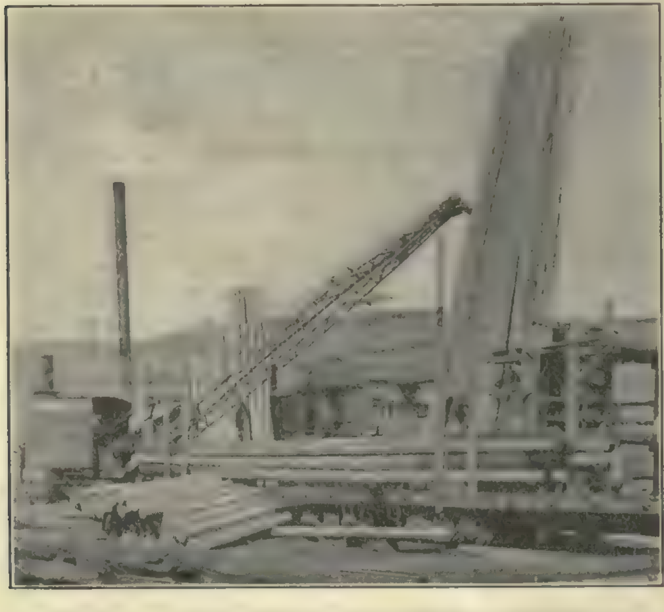
PERFORATING MACHINE IN OPERATION AT SANDPOINT, IDAHO, IN CONNECTION WITH THE TREATMENT OF CEDAR POLES WITH CREOSOTE

Puncturing Poles Before Impregnation

A Machine Designed to Puncture the Sapwood of Red Cedar Poles at the Butt Has Been Placed in Operation Which Assists Materially in Insuring Complete Impregnation

AN IMPROVED puncturing machine designed to puncture the sapwood of red cedar poles at the butt to permit a thorough impregnation by creosote has recently been put in operation by the Western Cedar Preservers Company at Sandpoint, Idaho. This machine is said to represent a long step forward in the preservation of cedar poles. It assures a full sap penetration with either green or seasoned poles treated by what is known as the "B" method. This consists of immersing the poles for from four to twelve hours in an oil bath heated to from 212 to 230 deg. F., followed by a cold oil treatment of from two to six hours.

The puncturing is done by forty-two iron bars 4½ ft. long, 3 in. wide and ¾ in. thick, which weigh approximately 37 lb. each. A detachable point holder on each bar makes possible the regulation of the depth and spacing of the puncture. At present, chisel-shaped points are in use, each ½ in. long and spaced so that a complete penetration will be obtained if the oil travels 1½ in. lengthwise of the pole and ⅛ in. crosswise.



LOADING POLES AFTER TREATMENT UPRIGHT IN AN 11-FT. TANK

Each bar works independently of all the other bars in order to take care of the irregularities of the pole. These bars are raised by cams and drop by gravity. The machine is constructed so that the operator can regulate the distance the bars drop by simply raising or lowering the hoist on which the pole rests. The pole is transported under the bars by live rolls and then raised into position by hoists. The part of the pole to be punctured is supported on two oscillating wheels, 24 in. in diameter and 18 in. wide. These wheels are so constructed that no matter what position the pole is in or what taper it may have it will have a full 18-in. bearing surface on the two wheels.

Discussing the results obtained, W. M. Leavitt of Spokane, manager and secretary of the company, said in a paper read before the American Wood Preservers at their seventeenth annual convention in San Francisco this past January: "The time at which complete impregnation may be observed varies from the time the pole is removed from the treating tank up to two months after the time of treatment. In a properly punctured pole we have not, however, had a single instance where we did not eventually secure a complete impregnation to the depth of the puncture providing the puncture did not enter the heart wood."

Cut Pole Repair Cost

STEEL poles have a habit, after being in place for several years, of rusting and rotting at the base where they enter the ground. Various methods have been used from time to time to strengthen or repair such poles. One method has been to fill the inside with concrete to a distance of 2 or 3 ft. above the ground and reset the pole in concrete. This method the Cincinnati Traction Company has used to some extent in the past. Another method which this company has used more extensively is to set a new pole in place of the one to be repaired, cart the old pole to the shops and swage on a new sleeve purchased to fit the lower section of the old pole. Under this latter method of treatment, the cost per pole repaired varied from $16 to $26.

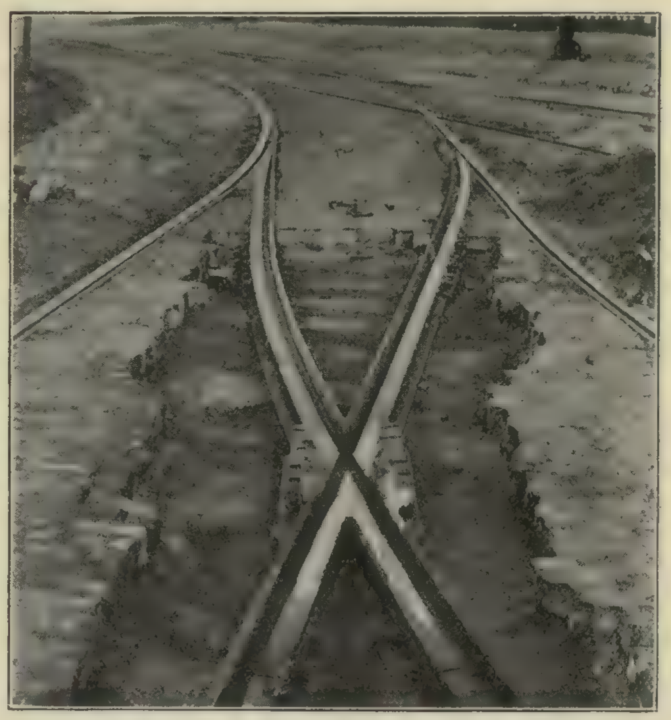
SLEEVE REINFORCEMENT OVER RUSTED PORTION OF STEEL POLE

About two years ago the company started repairing such poles in a new way and at a great reduction in cost. A large amount of old pipe, in scrap pieces, was bought up, in size 1 in. larger (measured by inside diameter, pipe size) than the lower sections of the poles. This was cut up into 24-in. and 30-in. lengths. When a pole is to be repaired the cross-arm and other "trimmings" are removed from the top, the sidewalk is cut away and the base exposed 12 or 15 in. below the ground. Then the section of pipe, as a sleeve, is dropped over the pole, the longer sections being used for the more seriously rotted poles. There is left a space of about $\frac{3}{16}$ in. between the pole and the inside of the sleeve. Metal wedges are inserted to maintain this even all the way round and grouting put in, filling the space and being finished off with a little slope at the top to drain off moisture which runs down the pole. In some cases these sleeves were arc welded at the top. When the grouting has set, the pole is then secured by filling in at the base, as before, and the trim put back on.

The appearance of the repaired pole is shown in the accompanying illustration. This also shows how little disturbance is necessary in the sidewalk. The most interesting part, however, is the cost. F. J. Venning, superintendent of overhead, who furnished the information for this article, stated that during the past two years 650 poles had been repaired in this manner at an average cost of $6.50. This is quite striking in comparison with the former cost of $16 to $26.

A Device to Prevent Rail Creepage

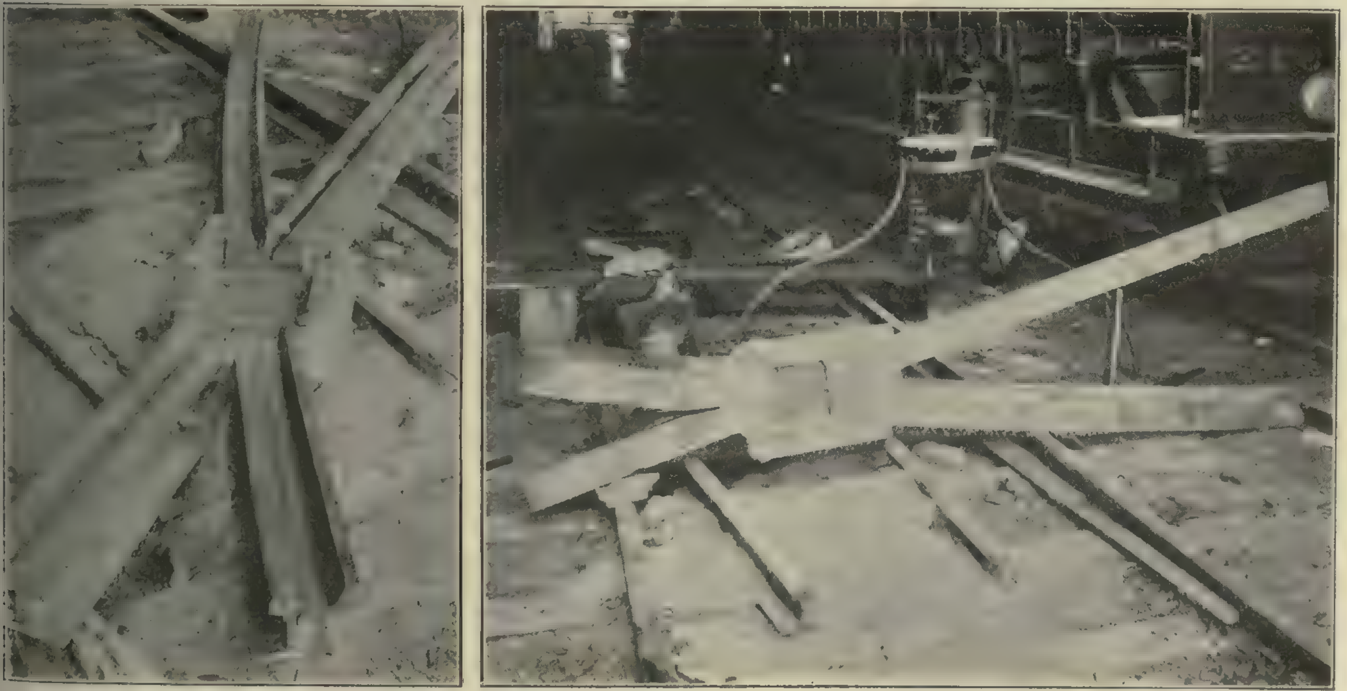
A NEW development has been made in the method of retarding creepage of rails by anchoring a number of ties to the joint tie. For connecting the ties together a new device called the "Trak-ankor" is being manufactured by the Track Specialties Company, New York City. The device consists of a flat steel bar punched with spike holes to be attached to the joint ties and the preceding four or six ties, depending upon the severity of the creepage. In order to bunch the joint ties, tighten the gage of track, or cause other track ills due to rail creepage, ties with this device must drag six or eight ties instead of two as with the usual type of anti-creeper. Based on 2,880 ties, spaced 22 in. apart, and 364 rails per mile, the cost per mile for the "trak-ankor" would be **$273.**



REPAIRED PART IN PLACE READY FOR SERVICE

Repairing Box of Manganese-Insert Frog

THE accompanying illustrations show a somewhat unique application of thermit welding in repairing the cast-iron box of a manganese-insert frog installed near the carhouses of the Union Street Railway, New Bedford, Mass. This box was broken just at the edge of the manganese steel center as a result of car traffic. In carrying out the repairs the frog was removed from the pavement and the manganese center was taken out. The end part of the cast-iron box outside the fracture was cut away with hammer and chisel, to provide space for the new metal. That part of the end of the cast-iron box which remained was then thermit-



TOP AND BOTTOM VIEWS OF THE WELDED BOX

welded in the usual manner to two rails on the same side. Top and bottom views of the complete weld are shown in the illustrations and give a fair idea as to the extent of the operation. The welding of this frog required two days of time and 85 lb. of thermit.

After the welding operation had been completed, the excess metal on the weld was removed and the manganese plates were again inserted in the cast-iron box and secured to the box by means of spelter. The repaired part was then reinstalled in the street. An additional illustration shows it in place ready for service.

Method of Signal Maintenance in Chattanooga

Analysis of Signal Troubles and Failures for Year 1920 as Compared with 1919 Shows Substantial Decrease, Which Can Be Attributed Directly to Improved Maintenance

THE annual report of the signal department of the Chattanooga Railway and Light Company, Chattanooga, Tenn., gives a comparison of the signal performance of the year 1920 with that of the previous year. The railway company has twenty blocks, comprising forty Nachod signals, of the trolley contact variety used for single-track opposing movements and permitting following movements through the same block.

The signals give indications by lights and disks, have oil-immersed relays and contactors of the wiping type without moving parts. Most of them were installed ten years ago. In giving a summary of its activities in 1920 the signal department reports that during the year nearly all of the signals had been repainted, two blocks of type MD signals were converted into type CD and eight blocks of type MD converted into type C, all this work having been done by the signal department.

Moreover, the relays in these signals were adjusted to operate on low voltage, such as occasionally happens on the line on which they are installed. Four old-style relays were overhauled, rewired and converted into the latest type. Five other relays were overhauled and adjusted. Thirty overhead trolley contactors were taken down and replaced with ones that had been previously repaired and painted, and these in turn were repaired and painted. Twelve poles having signals mounted thereon were rewired in conduit.

The department also installed and maintained Cheatham track switches. Four of the latest type for heavy duty were installed with drains to the sewer and are reported as working satisfactorily.

The total yearly signal movements of all signals in 1920 was 1,709,820 and in 1919 1,745,950, a movement being considered as one passage through a trolley contactor. The average yearly movements per block were 85,490 and 96,986, respectively, in 1920 and 1919, the average daily signal movements per block being 234 and 264 respectively. The numbers of movements per failure were 11,954 and 11,336, being a gain of 618 movements during 1920, which indicates improved maintenance. There were also thirteen fewer failures in 1920.

The accompanying table shows an analysis of signal failures for the two years. In explanation it may be stated that every kind of trouble reported is counted a failure, and it is stated that the car crews are not a bit lax in reporting trouble.

Under the heading "Line wires" is included all trouble with the line wires, whether open-circuited, crossed with each other, or crossed with other wires; 9.1 per cent of all failures were from this cause, while in 1919 this percentage was only 5.1. Blown fuses result mostly from lightning storms. "Relay trouble" covers everything involving the signal-box mechanism, such as bad coils, contact fingers and interior wiring. The troubles, together with setting and clearing contactors, are the only ones properly chargeable to the signal devices themselves and amounted to only 23.1 per cent of the failures in 1920, as against 33.4 per cent in 1919. From this it will be seen that more than three-quarters of the signal failures in 1920 were brought about by external conditions and did not arise from the signals themselves.

ANALYSIS OF SIGNAL FAILURES

	1920		1919	
Trouble Found	Number	Per Cent of Total	Number	Per Cent of Total
Line wires	13	9.1	8	5.1
Pole wiring	19	13.3	10	6.4
Blown fuses	16	11.1	29	18.6
Lamps out	34	23.8	15	9.6
Relay trouble	22	15.4	24	15.4
Setting contactor	4	2.8	9	5.8
Clearing contactor	7	4.9	19	12.2
Bad grounds	7	4.9	9	5.8
Miscellaneous	1	0.7	20	12.8
No trouble found	20	14.7	13	8.3
	143	100.0	156	100.0

These figures for 1920 show that a failure due to the signal mechanism occurred in one block on an average of about once in 220 days, which emphasizes the thoroughness of the maintenance program.

A daily signal report blank is used by the railway company. This report is dated and has separate sections for the dispatcher's report of the trouble and the signal department's report on its correction. The dispatcher's report has the following column headings: Division, Signal location, Reported by, Received by, Time received. The signal department's report is headed Time received, Date O.K., Time O.K., Nature of trouble, Signed by.

Aid in Solving Maintenance Problems

THE Westinghouse Electric & Manufacturing Company, in its plan of service to the electric railways, issues, from time to time, maintenance information under the name "Railway Operating Data." These data are prepared by practical engineers from the experience they have gained in visiting railway shops in all parts of the country. These data sheets contain information on all the varied maintenance problems that the operating man has to deal with. The subjects range from "Dipping and Baking of Railway Motors" and "How to Babbitt Motor Bearings" to "Installation of Air Piping to Prevent Freezing" and "Systematic Inspection of Car Equipments."

The railway operating data are first published in the *Electric Journal*. There is generally one subject and sometimes two or three covered in each issue. After the data have appeared in this manner, they are issued in loose leaf form by the railway department of the Westinghouse company, and the complete set, which at the present time comprises fifty individual articles, can be obtained free on application to any district office of the company.

Association News

Secretary Burritt Resigns

THE special meeting of the executive committee, mentioned in the issue of the ELECTRIC RAILWAY JOURNAL for March 12, was held last Tuesday at association headquarters to consider further the question of association finances. As a result of the meeting a letter was sent to all member companies by President Gadsden advising that E. B. Burritt had presented his resignation as secretary-treasurer, and that this resignation had been accepted. J. W. Welsh, special engineer of the association for the past two years, was appointed acting secretary to serve until further action is taken by the executive committee in the appointment of a permanent successor to Secretary Burritt.

Mr. Gadsden was asked if he cared to make a statement on the situation. He replied that as soon as the auditors of the association had finished their audit a complete statement of the situation would be sent to all members of the association. The books of the association are being audited under the direction of M. R. Boylan, general auditor of the Public Service Railway of New Jersey, who has audited the books of the association annually for a number of years. Mr. Gadsden said that so far the audit seems to show that the shortage may be in the neighborhood of $50,000 and that the defalcations were made by the bookkeeper, Gibson, through cashing vouchers which had been signed in blank by Secretary Burritt, when he expected to be absent from town. Gibson, as stated in the last issue of this paper, has been arrested, and in view of the failure of Secretary Burritt to safeguard the funds, it became necessary for the executive committee to accept his resignation.

When asked what the effect of these losses on the association would be Mr. Gadsden said that the executive committee had already assurances from a sufficient number of large interests in the association to be sure that when the amount of the shortage was determined there would be no difficulty in having it underwritten. This would mean that the amount so advanced to the association could be paid off by it over a series of years without in any way hampering the essential functions of the association. Continuing, President Gadsden said:

"We propose to take advantage of this situation to have a thorough examination made of the work of the New York office for the purpose of increasing its efficiency and decreasing its expenses, but we do not propose to let what has happened interfere in any way with the usefulness of the association in any essential features. Such changes as are made will be for the purpose of increasing efficiency and not merely for economy. One suggestion which the executive committee has received within the last week and which will probably be adopted is that in the future the offices of secretary and treasurer will be permanently divorced. The question of the selection of the new permanent secretary should have the serious thought of the entire industry. The executive committee will meet probably some time in April to select a new secretary. In the meantime suggestions of the best man to fill the vacancy will be welcome."

Mr. Burritt, the retiring secretary, was appointed to the office in 1913, succeeding H. C. Donecker, who resigned to become assistant general manager of the Public Service Railway of New Jersey. Prior to 1913 Mr. Burritt had been connected with the Washington Railway & Electric Company for a period of about six years.

Connecticut Company Section Holds Largest Meeting

THE Connecticut Company held its thirty-eighth meeting in New Haven on March 3. The Silver Street freight house, which has just been remodeled for use as a freight terminal, was used as an assembly hall. Here luncheon was served at 6:30 p.m. to 315 members and guests, an attendance which sets a new record. The men from Hartford, Meriden, Middletown, Bridgeport and Waterbury were brought in special cars.

The new president, Frank P. Harlan, opened the meeting, introducing Lucius S. Storrs, who was warmly welcomed. Mr. Storrs said that the employees of the company should be thoroughly posted on company matters. He began his talk with a history of the company from its incorporation in 1905 up to the present time. Some comparisons of earnings, expense, etc., were displayed on a large chart for 1917, 1918, 1919 and 1920, including the figures covering payrolls, coal, material, accidents, power purchased, etc. Mr. Storrs explained to the employees the bills before the present Legislature for relief from various burdens so that they might be prepared to answer questions and give facts and figures when the occasion required.

Vice-President J. K. Punderford spoke next, thanking the men for the good work done in removing snow after the storm of Feb. 20. Another speaker was John W. Colton, formerly executive assistant to Mr. Storrs and now on the editorial staff of the Hartford *Times*. He stated his belief that the Connecticut Company is in need of the proposed legislative relief.

New Arc-Welding Machine

A NEW electric arc-welding machine, especially intended for rail bonding and trackwork, but also adaptable for general repair and shop welding, has been brought out by the Wilson Welder & Metals Company. The machine was designed at the request of the Ohio Brass Company, which acts as sole selling agent.

A fundamental principle of this machine consists in providing uniform heat per unit area in the weld by means of a short arc automatically controlled. With this machine the potential across the arc is but 18 volts, and with this voltage it is impossible for the operator to hold a long arc. Current control is provided by means of a solenoid operating in conjunction with a carbon pile.

During welding the regulator automatically maintains the current at a practically constant value regardless of line variations. The short circuit current is held to about 10 per cent of the welding current. Heat is controlled within 4 per cent.

The dynamotor is wound for two voltages. One winding is for operation on from 350 to 650 volts direct current and the other winding on 150 to 350 volts direct current.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Uncompleted Track Bought

City of Detroit Acquires Lines Never Completed by the Detroit United Railway

An agreement was reached as to the price which the city of Detroit will pay for the stretch of the Detroit United Railway's track on Harper Avenue between Gratiot Avenue and Montclair the last day allowed by Federal Judge Denison in his order. The Judge, in deciding the case, issued an order that two arbitrators be appointed, and in case they could not agree as to the price a third arbitrator was to be appointed.

RAILWAY TAKES LEGAL ACTION

The track on Harper Avenue was never completed by the Detroit United Railway owing to the action of the City Council in rescinding the day-to-day agreement under which it was being constructed by the company. When the city proceeded to have the Department of Public Works remove the track from the street in order to make provision for the Municipal Railway, the company started proceedings in the federal court in February to prevent the tearing up of the track. Judge Denison of the District Court of Appeals ordered the city to post a sum of $50,000 as a guarantee to cover the sum settled upon by the arbitrators. The $50,000 was supplied out of the Municipal Street Railway bond issue.

Prof. Henry C. Riggs of Ann Arbor was appointed arbitrator by the Detroit United Railway. The city officials selected William H. Maybury. The track, approximately 4,800 ft. long, was valued by the Detroit United Railway at $47,191. The value finally agreed upon by the arbitrators, or the amount to be paid by the city, was $40,686. In deciding the amount to be paid for the concrete base upon which the rails were laid, the arbitrators allowed the Detroit United Railway 50 per cent of the cost. The city contended that only 15 per cent should be paid.

ST. JEAN LINE WILL NOT BE DENIED TO THE CITY

It has been further indicated by the Detroit United Railway that the crossing of the company's Mack Avenue track by the municipal cars on the St. Jean line will not be opposed. This is in accord with the company's announcement that crossings of its tracks will not be opposed provided the plans are submitted previously to its engineers for approval. The company's engineers and engineers for the city Street Railway Commission are to confer regarding the crossing at Mack and St. Jean Avenues. The present crossing was installed by the city under police protection while E. J. Burdick, general manager for the Detroit United Railway, was marooned on Belle Isle. In case the engineers do not reach an agreement for modification of the order issued by Judges Hart and Johnson restraining the city from crossing the company's tracks, the matter will be arbitrated.

The case is still pending which involves the request of Corporation Counsel Clarence E. Wilcox that the court pass on the city's rights to cross the company's tracks. Judges Hart and Johnson, in the Wayne County Circuit Court, ruled that the Mack Avenue crossing should not have been made by the city until after a hearing had been held on the company's temporary restraining order.

U. S. DISTRICT COURT ORDERS HARPER AVENUE TO CITY

The present proceeding with respect to the Harper Avenue track is in accordance with an order made by the United States District Court requiring the Detroit United Railway to turn over to the city the property of the company on Harper Avenue and Montclair Avenue constructed under the day-to-day agreement of 1919.

City Paid—Injunction Denied

Federal Judge Edward E. Cushman on March 4 filed a written decision in the United States court denying the motion for a temporary injunction by the Puget Sound Power & Light Company to tie the hands of the city officials in the Seattle railway bond case. Attorneys for the Power & Light Company stated when the case was called in the United States District Court that they abandoned the motion, and Judge Cushman's decision followed.

The motion was directed against the city of Seattle, Harry W. Carroll, city comptroller, and Ed. L. Terry, city treasurer, to enjoin them from applying the receipts from the municipal railway to maintenance and operating costs, or to anything other than payment of interest due on March 1, and to meet interest and principal on the $15,000,000 railway bond issue.

The treasurer filed an affidavit in the federal court stating that he had paid $375,000 due in interest on March 1, after filing of the motion which has now been denied. Judge Cushman's decision stated that the motion is denied without prejudice, because the interest was paid, and because of the action of attorneys for the plaintiff in abandoning the motion.

Albany Strike Before Court

Employees Bring Action Under Statute Passed by Last Legislature—First Case of Its Kind

Application was made on March 11 by the Albany and Troy unions to Supreme Court Justice Wesley O. Howard of Troy, N. Y., for a peremptory order directing the United Traction Company to proceed to arbitrate the strike controversy.

The unions, in arguing the petition, will demand that the company be compelled to live up to an arbitration agreement incorporated in a contract made with the men which does not expire until June 30 of this year.

HEARING SET FOR MARCH 19

Harry B. Weatherwax, vice-president of the United Traction Company, was served with a notice of the action. Application for the order will be argued on March 19. The application was made under chapter 275 of the laws of 1920, enacted by the 1920 Legislature and signed by former Governor Alfred E. Smith.

It is the first time the law has ever been invoked in an industrial dispute, though it has been held constitutional by the Court of Appeals in a case involving a mercantile dispute.

It will be contended that the expiration of a memorandum of agreement as to wages, which is a part of the major contract containing an agreement to arbitrate "any controversy" that might arise, did not void the major contract itself, and that that contract is now in effect.

The unions base their plea for a court order to force arbitration of the controversy on two sections of a contract made between the organizations and the company, "on or about the first day of July 1920."

OPPOSITION TO ARBITRATION EXPLAINED

The company has based its opposition to arbitration of the present strike controversy on a memorandum of agreement entered into on July 30, 1920, in which was incorporated a schedule of wages and compensation for different classes of workers.

Chapter 275, known as the arbitration law, was passed by the Legislature of 1920 and became a law April 19 by approval of Governor Smith. The law provides that "A provision in a written contract to settle by arbitration a controversy thereafter arising between the parties to the contract, or a submission hereafter entered into of an existing controversy to arbitration, pursuant to the code of civil procedure, shall be valid, enforceable and irrevocable."

One-Man Cars Attacked

Bills Against This Type of Rolling Stock Introduced in Massachusetts, Connecticut and Iowa

Backed by the American Federation of Labor the street carmen's unions in Massachusetts are making a vigorous effort to have the operation of one-man cars prohibited in the commonwealth by means of legislative enactment. At a public hearing held by the legislative committee on street railways the proponents of a bill to abolish these cars brought up all the usual arguments, stressing principally the alleged danger to the public which is claimed by the labor leaders to be the prime reason for their stand against them.

NEW CARS DEFENDED

Opposition to the bill was registered by nearly every railway in the state. The strongest plea against this bill was registered by the trustees of the Eastern Massachusetts Street Railway. This company is now operating more than 80 per cent of its mileage with one-man cars and Chairman Homer Loring of the Board of Trustees made it plain to the committee that it was a case of one-man cars or no cars at all. He characterized the bill as "an act to compel street railways to hire needless men against the best interests of the car riders, who are demanding lower fares."

So satisfactory are the one-man cars of the Eastern Massachusetts Street Railway from the standpoint of economy that Mr. Loring expressed the opinion that if they had been introduced to the present extent about two years earlier the number of abandoned lines in Massachusetts would not have reached the present unfortunate size.

"The one-man car," said Mr. Loring, "is the salvation of the street railway industry. To prohibit its operation would impose great hardships upon thousands of people on the Bay State system who would lose their railway service entirely if the one-man cars were taken off."

CONNECTICUT BILL FAILS

Advantages of the long double-truck one-man cars which the Connecticut Company has remodeled and put into operation at Meriden, Conn., were set forth by J. K. Punderford, vice-president and general manager, at a hearing before the Public Utilities Commission at Hartford on Feb. 17. The hearing was held in response to a petition signed by a number of residents, alleging that the new long one-man cars were "unsafe, impractical and very inconvenient." The petition was presented by Frank O'Meara, Hartford, representing the street railwaymen's union of Connecticut. Most of the witnesses called were motormen and conductors.

The Connecticut House has since rejected the trolleymen's bill calling for a crew of two competent operators for trolleys on single track lines and on cars weighing in excess of 10 tons, no qualified motorman to do any duties of a conductor while the car is in motion.

A bill will be presented in the Iowa Legislature prohibiting the use of one-man cars in cities of more than 25,000 population, according to President Charles E. Rogers of Local No. 312, Street & Electric Railway Employees of America.

SIX CITIES AFFECTED

The proposed bill is of interest at Davenport from the fact that the Tri-City Railway has unofficially suggested the adoption of the safety car as a means of cutting operating expense and solving the traction problem along another avenue than that of fares.

Other cities in Iowa with more than 25,000 population are Sioux City, Waterloo, Cedar Rapids, Clinton and Ottumwa.

B. J. Denman, president of the local traction lines and vice-president of the United Light & Railways Company, believes that any one-man bill will fail of passage. Mr. Denman said:

> It is probably along the lines of the anti-safety car bills which have been introduced in the Legislature for the last five years. Menace to use of safety cars through legislation is not a serious one. I am confident that the cities now using safety cars will put up a strong fight for their retention.

Indeterminate Franchise Bill Before Governor

The indeterminate permit bill, which extends until July 1, 1923, the time during which public utilities in Indiana may surrender their franchises for indeterminate permits and come under the jurisdiction of the Public Service Commission, is now before the Governor for signature.

Three Indianapolis utilities, the Indianapolis Street railway, the Citizens' Gas Company, and the Indianapolis Water Company, have not surrendered their franchises, and will be in a position to act under the new law. Officials of the water company said no decision had been reached in regard to surrendering the franchise, and officials of the gas company said no action has been taken on the proposition. It is understood the railway will take advantage of the provisions of the law.

E. I. Lewis, chairman of the Public Service Commission, said the rate situation of no Indianapolis or other utility would be changed by the surrender of a franchise and acceptance of jurisdiction of the commission. He pointed out that under a decision of the Supreme Court the commission has granted emergency rate relief to the Indianapolis Street Railway and that the water and gas companies have petitions pending before the commission. The result, therefore, of the surrender of a franchise would be merely to place the public utility under the jurisdiction of the commission in other matters.

About sixty companies, operating approximately 100 utilities, which did not surrender franchises under the old law are in a position to act under the present legislation.

Municipal Relief Granted

Council of South Bend, Wash., Exempts Electric Railway from Paving Obligations

An excellent example of progressive municipal legislation is found in the City Council of South Bend, Wash., passing an ordinance on Feb. 9, 1921, granting exemption from paving along its tracks in that city to the Willapa Electric Company, a Sanderson & Porter property.

The preambles contained in this ordinance reflect a broad view of paving obligations imposed on electric railways. They are as follows:

> The City Council of the city of South Bend, Washington, do ordain as follows:
>
> Whereas, the Willapa Electric Company is the assignee and owners of the franchise rights and properties granted to the Twin City Railway under Ordinance No. 368, which was passed by the Council of the city of South Bend, Washington, on Jan. 3, 1911, and approved by the Mayor of said city on said date; and
>
> Whereas, the existence and operation of street railways are vital to the welfare and life of every city; and
>
> Whereas, street railways can no longer operate and earn a fair return on their investments if cities require them to expend funds for paving which is solely used and worn out by the public in general and not by the railway; and
>
> Whereas, it is now universally conceded that exemption from paving burdens is essential to protect the street railway industry from bankruptcy, and such exemption is recommended by the Federal Electric Railways Commission and also by the Public Service Commission of the State of Washington, for both of said commissions find that moneys expended for paving are ultimately paid by the patrons of the street car company, for it is the fares of these patrons from which the street railway must receive its funds in order to conduct its business and to pave the streets, and it is unfair to place this indirect tax and burden solely upon those who ride on the street cars; and
>
> Whereas, the city of South Bend, Washington, desires to protect existing investments made in good faith and thus encourage expansion and new and additional investments; therefore
>
> Resolved, That Sections 2 and 3 of Ordinance No. 368, which was passed by the Council of the city of South Bend, Washington, on Jan. 3, 1921, and approved by the Mayor of said city on said date, be amended.

The sections of the original franchise amended by this ordinance were those which required the railway to pave with the kind of material used by the city.

$5,000 Prize Goes a-Begging

Last May the London County Council, London, England, offered a prize of £1,000 for the ideal tramcar. The competition was advertised all over Great Britain and the Colonies, in the United States, and in France. Some seventy-six proposals were sent in; the examiners have now reported on them. They say that not one of these efforts deserves the £1,000 prize:

> The bulk of the candidates have deemed it sufficient to send in one or more rough sketches, with incomplete descriptions of varying length. In these cases, no attempt has been made to work out the proposals, and, where it has been found possible to develop them, they have soon proved to be impracticable of application. There is a conspicuous dearth of proposals in respect to the electrical equipment and trucks or bogies. So much so that, in a majority of cases, a complete lack of electrical and mechanical knowledge is apparent with regard to these most important features of car design.

Moreover, many competitors have made suggestions incompatible with the local regulations, and even with the physical conditions.

$600,000 Terminal Planned

Expenditures Will Be Carried Out in Interest of Interurban at Indianapolis

Plans were submitted to the Public Service Commission of Indiana on March 14 by the Indianapolis Street Railway for a central interurban freight terminal, to be constructed on the site now occupied by the Terre Haute, Indianapolis & Eastern Traction Company freight house at Kentucky and Oliver Avenues, at a cost of more than $600,000. Accompanying the plans were drafts of proposed contracts between the street railway and the interurban companies entering Indianapolis, which provide for relieving the local company from supplying freight facilities and placing the freight business entirely in the hands of the interurban companies.

A THREE-YEAR PROGRAM

The entire project is to be completed in three years and all freight will be handled at the central terminal after that time. The terminal facilities at the Traction Terminal station and adjacent buildings would be devoted exclusively to passenger and express service.

The plans submitted for the approval of the commission call for taking over the terminal of the Terre Haute, Indianapolis & Eastern Traction Company by all the interurban companies and the construction of additional facilities under three proposed projects.

The first project proposed for the construction of the new terminal calls for an addition to the present structure of 7,230 sq.ft. of floor space and 2,400 sq.ft. of platform. This work, together with the construction of two additional tracks and driveways, will involve an expenditure of $82,674.

The second project submits proposals for the construction of the west end of an outbound freight house and the completion of track projects. This proposed section of the freight house will have 7,230 sq.ft. of floor space in the building and 4,800 sq.ft. of platform. This project involves an expenditure of $67,344.

OTHER ROADS CONSENT

The third project calls for the completion of the second outbound freight house, an entire inbound freight house and driveways. The inbound freight house will have a floor space of 22,500 sq.ft. and the remaining section of the outbound freight house will have floor space of 9,300 sq.ft. in the building and 5,400 in platform. The total expenditure involved in the third project is $205,830.

A. W. Brady, president of the Union Traction Company of Indiana, stated that he was authorized to say that the interurban companies have tentatively censented to the project and have agreed among themselves on the basis for proceeding with the proposed work.

Robert I. Todd, president of the Indianapolis Street Railway, submitted a letter to the commission explaining the financial arrangements in the new contracts proposed for the companies. Mr. Todd said that the proposed readjustment of the freight contracts will result in about $28,000 a year additional income for the company.

Franchise Revision Urged at Richmond

Recent checks made by the Virginia Railway & Power Company in Richmond show that about seventy-five jitneys operate off and on throughout the day and that during the "rush hours" this number is increased to around 125. Mr. Wheelwright, president of the company, says the loss in revenue to his company in this way is considerable and may be expected to increase.

He regards the jitney as a general menace to the main transportation system of any community, and in a statement to the newspapers quoted from the opinion rendered by the Massachusetts Public Service Commission in the case of the Union Street Railway a few months ago which stated the situation very clearly. This decision, similar to many others, held that as between rival systems of transportation, it is reasonable and proper that the one which of itself is best adapted to furnish the form of service suited to urban conditions should survive.

Mr. Wheelwright said that if the same requirements were made of jitneys as are made of the street railway, the latter could take care of itself in competition for the traffic, but with a parasite eating away its short-haul traffic, the street railway cannot be expected to extend its service. This situation, he said, emphasizes more strongly than ever the necessity of prompt action on the part of the City Council on the petition of the company for a new franchise which has been pending since last autumn.

Italian Commissioners Will Inspect American Electrifications

The Italian-American Electric Company, representing all the Italian power companies, in connection with the Italian State Railways, is sending to the United States and Canada a railway electrification committee consisting of Guido Semenza, Milan, consulting electrical engineer; Gian G. Ponti, engineer, Municipality of Turin; Curzio De Regibus, Bologna, engineer, State Railway Service, and Ferdinando Cusani, Milan. The commissioners expect to arrive about April 23 on the Imperator. It is proposed to visit the following electric installations: Norfolk & Western; Pennsylvania; Baltimore & Ohio; New York, New Haven & Hartford; New York Central & Hudson River; Long Island; Hoosac Tunnel; London-Port Stanley; Canadian National Railways; Michigan Central; Chicago, Milwaukee & St. Paul; Butte, Anaconda & Pacific; Great Northern; Southern Pacific; California Central; Pacific Electric; Salt Lake-Garfield and important interurbans. The members of the commission will also study various city rapid transit systems.

New York Bill Advanced

Senate Rejects All Amendments—As
sembly Advances Measure—Final
Passage Likely March 22

All suggested amendments to the sc
called Miller traction bill were vote
down on March 16 and the measur
looking toward the extension of relie
to the railways of Greater New Yor
was passed in its original form by th
Senate by a vote of thirty-three
eighteen. In the Assembly the bill wa
advanced to a third reading and place
in a position for final passage o
March 22.

The debate on the bill grew acrimo
nious at times. The principal objectio
to its passage as voiced by the oppos
tion was to clothing the proposed ne
commission with power to put int
effect temporary rates pending mor
extended study of the problems befor
them. Another provision that has bee
the subject of attack is the one in th
section on unification of the line
which makes acceptance of the recon
mendations of the commission optiona
with the companies and obligatory o
the city. The valuation provision ha
also been under fire. It provides for
valuation conducted under direction
the commission, such valuation
finally determined to be the basis f
allowances to the railroads under th
readjustment plan. The objection
this is that no means for review a
provided.

The action of the Senate on March
makes certain that the transit bill wi
be in the Governor's hands for approv
next week. It should become a la
within a fortnight. The Governor ha
already made it known that he will giv
the opposition another inning and wi
fix a date for a public hearing when th
bill reaches him. It is not expecte
however, that he will delay his approv
of the measure more than a few hou
after the formality of this final hearin

New Washington Terminal in Us

The Washington, Baltimore & Anna
olis Railway is now using its new te
minal at Twelfth Street and New Yor
Avenue, Washington, D. C. The stree
at that corner lend themselves partic
larly to a convenient arrangeme
which allows the cars to make th
circle of the terminal building. Th
loading platform is on the company
own ground. This does away with th
troublesome congestion which could n
be avoided when the large interurba
cars were forced to take on passenge
in the street. The terminal buildi
provides ample space for the ticket o
fice, two large waiting rooms and
commodious newsstand, with numerou
offices on the upper floors.

One of the features of the new te
minal is the commodious platfor
space, where several cars can ta
on and discharge passengers simult
neously. In addition there are tw
sidetracks which may be used for t
accommodation of cars being held
reserve.

ettlement at New Orleans Urged

No estimate has yet been made of ie probable valuation of the railway roperty of the New Orleans Railway & ight Company, reports to this effect the contrary notwithstanding. Re-eiver O'Keefe on March 6 published a tatement in the local papers in which e vigorously denies the published tatement attributed to Commissioner Ialoney of the City Public Utilities ommittee, that the company's own stimates showed the railway property be valued at $45,000,000. Mr. O'Keefe as written a letter to Commissioner Ialoney that no figures had ever been iven out by him to indicate such an stimate.

As the responsible head of the com-any, Mr. O'Keefe declared in the letter the commissioner: "I have neither ırnished nor authorized any figures." Ie says that the engineering experts mployed by the company had valued ie property at $55,000,000.

Hugh McCloskey, chairman of the tizens' advisory committee on pub-c utilities appointed by Judge Rufus . Foster of the Federal District Court, appealing through the local press to ie public for such constructive sugges-ons and helpful advice as they might e able to offer, in written communica-ons. Each particular suggestion, it is nnounced, will be fully studied by the ommittee in special charge of the sub-ect matter. A prompt settlement of ie problem, it is urged, is imperative.

Radial Finding Expected Soon

The finding of the commission ap-ointed to inquire into the feasibility nd financial prospects of a system of ublicly owned hydro radials for On-ario is expected to be presented hortly. In a statement on the sub-ect Premier Drury declared that the overnment will be governed by the eport and the facts brought out. He aid:

> If our consideration of the matter is ıch as to make it appear that the gov-rnment is not warranted in pledging the redit of the province to the enterprise, we ould not, however, stand for a moment the way of the municipalities under-aking to go ahead on their own responsi-ility, with the one proviso that, with the acts before them, the electors should again ote on the matter.

Effect of Transportation on Real Estate

"Transportation is probably the reatest artificial agency in lowering, nhancing and distributing real estate alues. Whatever depreciation it may ause is offset by appreciation of new ections which it opens up." This the connecting link between trans-ortation and real estate as explained y W. R. Warner, real estate agent f the Interborough Rapid Transit ompany, at a recent Y. M. C. A. ecture in New York. The sub-ect of the discourse was "Transporta-ion as It Affects Real Estate." Mr. Varner outlined very briefly the his-orical development of transportation rom the early days of stage coach to the present era of elevated and subway lines, showing that progress was the direct result of adequate means of transportation. Probably the greatest owners of real estate in the country are railroads. As proof of this statement Mr. Warner said that the Interborough Rapid Transit Company owned about $40,000,000 worth of real estate besides its strictly railway property. This has been secured through incidents of operation in the acquiring and abandonment of lines. As an example of lack of progress because of inadequate transportation facilities he cited modern China.

Dorchester Transit Study Continued

The Massachusetts Legislature has passed a resolve directing the Department of Public Utilities and the Boston Transit Commission to continue, jointly, the investigation of proposed rapid transit extensions of the Boston Elevated Railway in the Dorchester District of Boston. Details of the report of the commission to the Legislature were published in the ELECTRIC RAILWAY JOURNAL, Feb. 19, 1921. Several proposals are under consideration, including plans to utilize and electrify existing steam railroad branch lines in connection with the rapid transit service of the elevated.

Municipal Ownership and Jitney Bills in Iowa

Iowa cities will have the right to own and operate railways if a bill introduced in the Iowa Senate becomes a law. The bill is fathered by H. W. Byers, former corporation counsel for the city of Des Moines and at the present time in charge of the city's legal cases in connection with its difficulties with the Des Moines City Railway.

The bill as prepared by Mr. Byers gives cities the right to take over and operate railways in times of strikes or other public emergencies and authorizes cities to fix rates of fares for companies operating within the city limits and grants to the municipality power to prescribe the character of the service to be furnished. By the terms of the bill rates of fare may be fixed for a period of twenty-five years in cities where companies operate without franchises. Where a franchise is granted such time limit is fixed at ten years. Any plan for municipalization must be approved by a majority vote at a general election.

Motor buses and jitneys will be under stricter regulations in Iowa by the terms of a bill introduced in the House. The measure provides for a license fee of $100 for each motor bus and truck operated for hire and places the complete jurisdiction and control of the vehicles under the regulation of the State Board of Railway Commissioners. The bill further provides that operators of such vehicles for hire will be required to give bonds of $7,500 for the first vehicle and $2,500 for each additional vehicle.

News Notes

Careless Smoker Caused St. Louis Fire.—Investigation has disclosed that the fire which destroyed the De Balivere carhouse of the United Railways, St. Louis, Mo., on Jan. 3 started in a window slot where, doubtless, a smoker dropped a cigar or a cigarette stub which smoldered for several hours before the car itself burst into flames.

Amalgamated Paper Reprints Journal Article. — The *Union Leader* of March 12 has reprinted the article entitled "Service-at-Cost Plan an Incentive to Co-operation," which W. D. Mahon, president of the Amalgamated Association and member of the Federal Electric Railways Commission, wrote for the ELECTRIC RAILWAY JOURNAL in the issue of Feb. 12.

Wage Agreement to Stand.—Division No. 689 of the Amalgamated Association has decided not to reopen the wage agreement with the Capital Traction Company, Washington, D. C., this spring. Business Representative John H. Cookman says that the underlying cause for such action is not the present lowered cost of living, but the belief that the reduction in living costs will continue.

Roads and Road Transport Considered.—The first annual conference of the Institute of Transport was held in Manchester on Jan. 27 and 28. It was attended by nearly 500 persons. Though tramways are included within the scope of the institute, no papers on the subject were presented. The topics dealt with were roads and road transport, railway locomotive workshops, and canals.

Motor Buses May Replace Street Cars.—The Wisconsin Railroad Commission has announced that it will hold a hearing on the request of the Milwaukee Electric Railway & Light Company to substitute motor bus service on the Tippecanoe branch of the Howell Avenue line in Milwaukee. In its petition the company stated that the track on the branch in question is in poor condition, that reconstruction will cost $37,000, and that the branch has never paid expenses.

Men Not to Press Wage Demands.—The employees of the London (Ont.) Street Railway, who had demanded an increase of wages from 48 cents to 52 cents an hour, have decided to continue work at the present scale. The road has been under the management of the Ontario Railway & Municipal Board for the past year as the result of a series of strikes for more pay. The board has been paying the men a bonus of 1 cent an hour when the earnings of the company warranted it.

Inspection in Interest of Hydro Commission.—Engineers of the Ontario Hydro-Electric Power Commission are inspecting the right-of-way, rolling stock and equipment of the Chatham, Wallaceburg & Lake Erie Railway, with a view to adding the road to the system of hydro radials of the province. The municipalities along the line of the railway have urged the commission to take the line over. For the past few years it has been owned by the Mackenzie & Mann interests.

Employees of Municipal Line Receive Increase.—The New York City Board of Estimate increased the wages of municipal trolley employees on Staten Island on Feb. 25. The old scale for motormen and inspectors of 50, 55, 60 and 65 cents an hour has been raised to 57, 62, 67 and 72 cents. Foremen, linemen and carhouse foremen have been raised from 75 cents to $1; foremen of track laborers from 60 cents to 75 cents and $1; track repairers to 55 and 60 cents.

Want Pay Reconciled.—Conductors and motormen employed by the Alton, Granite & St. Louis Traction Company, East St. Louis, Ill., have opened negotiations to obtain the same rate of pay as men employed by the East St. Louis & Suburban Railway. C. B. Thomas, counsel for the receivers, said a conference would be held soon at which all questions concerning the receivership would be decided. Employees of the Suburban are paid 60 cents an hour, while the traction men get 59 cents an hour.

Trustee Control Attacked in Massachusetts.—The committee on street railways of the Massachusetts Legislature has granted leave to withdraw on two bills aimed at the trustees of the Eastern Massachusetts Street Railway who are operating the road under a public control act of the Legislature. One bill called for an investigation of the conduct of the property by the trustees, and the other bill sought to remove the road from the control of the trustees and return it under the general law to the ordinary regulation of the Department of Public Utilities.

City Loses in Des Moines Case.—The city of Des Moines, Ia., has lost its right to appeal from the decision of Judge Martin J. Wade in the 8-cent fare order. The appeal was heard by the full bench of the United States Circuit Court of Appeals at Kansas City on March 4 and was thrown out by reason of the fact that the city had not made the railway employees' union a party to the appeal. The union was an intervenor in the original proceedings and city attorneys overlooked this fact in filing the appeal. Attorneys for the city now admit that their only program is to wait for a decision from the Supreme Court of Iowa in the Ottumwa street railway case.

Another Canadian Electrification Proposal.—Proposals have been made for the electrification of the line of the Canadian Pacific Railway between New Westminster and Coquitlam, B. C., and the operation of this branch by the British Columbia Electric Railway. The line is about 8 miles long. Overtures made by the board of trade of New Westminster have met with rejection by the British Columbia Electric Railway on the ground that the company cannot undertake further capital expenditures at present and owing to the fact that other interurban lines operated by it do not indicate that the venture would be profitable. The Canadian Pacific Railway is required to meet all main line trains at Coquitlam and even this service is unsatisfactory to New Westminster people. There is a considerable mileage of freight yards in New Westminster which would come under the electrification scheme.

Blame Fixed for Trolley Collision.—Coroner John J. Phelan recently handed down a decision in the matter of fixing the responsibility for the collision on the lines of the Connecticut Company at Shelton, Conn., which resulted in ten fatalities and the loss of two cars. Besides holding the crew of the southbound car responsible the coroner also blamed Stephen T. Palmer, Shelton town clerk and judge of probate, who was taking home a five-gallon can of gasoline. Chief Engineer E. I. Rudd, in his report to the Public Utilities Commission, found that the number of deaths was caused by "asphyxiation and burns resulting from the sudden ignition of gasoline which escaped from a five-gallon can on the front platform of the southbound car." It was also found that the dead motorman failed to throw signals. The coroner said that the matter should be handled by the Public Utilities Commission in order that a like disaster may be prevented in the future.

Programs of Meetings

Southwestern Electrical & Gas Association

The Southwestern Electrical & Gas Association will hold its 1921 convention at the Hotel Galvez, Galveston, Texas, on May 18-21.

American Society of Mechanical Engineers

The spring meeting of the American Society of Mechanical Engineers will be held in Chicago at the Congress Hotel from May 23 to May 26. Sessions are planned by the Professional Sections on Aëronautics, Fuels, Management, Material Handling, Machine Shop, Power, Forest Products and Railroads.

Ontario Safety League

The monthly meeting of the executive committee of the Ontario Safety League was held at the King Edward Hotel, Toronto, on March 8. The meeting received a report of the subcommittee on the annual meeting. This report calls for a two-day safety convention to be held in Toronto on April 27 and 28.

Railway Supply Manufacturers' Association

After a thorough study of the entire situation both among the manufacturers composing the Railway Supply Manufacturers' Association and the railroad executives the executive committee of the Railway Supply Manufacturers' Association has unanimously decided to postpone the June, 1921, R. S. M. A. exhibit at Atlantic City. The decision was prompted by the fact that railroad and general business is depressed and that the desire exists everywhere to curtail expenditures in every possible direction. The association further gives notice that in view of the fact that it has postponed the exhibit and will dispose with its annual meeting and in no way be officially represented at the meeting of the mechanical division and purchasers and stores division of the American Railway Association it will not be necessary for any manufacturer to plan to have representatives present at meetings of the railroad officials.

Boat Trip for C. E. R. A.

The summer boat trip of the Central Electric Railway Association is assured. The committee in charge of arrangements, of which S. D. Hutchins is chairman, has just completed negotiations with the steamship company whereby a three-day or five-day cruise on the Great Lakes will furnish the setting for the regular summer meeting of the association. In order to secure the steamer *South American* for the usual trip from Toledo to Chicago, the committee had to contract for the round-trip from Chicago to Toledo and return as there was no other party desiring the boat for the east bound trip as in former years. This was done in anticipation that many members would be glad to extend the cruise two days by taking the boat at Chicago and the enthusiastic manner in which this plan has been received by the few who have been approached seems to bear this out.

The steamer will leave Chicago Sunday morning, June 26, and proceed without schedule stops to Toledo, arriving there Tuesday morning, June 28, about 8:30. It will leave there at 10 o'clock the same morning and arrive at Detroit at 3. The cruise from there will be routed through Lake Saint Claire, Saint Claire River, Lake Huron, Saint Mary's River, the Soo Locks, Mackinac Island, across Lake Michigan into Greenbay, Sturgeon Bay and thence to Benton Harbor and Chicago. The boat will arrive at Benton Harbor at 8:30, July 1, and at Chicago at 1 p.m.

The tickets for the trip including meals and berth and war tax will cost $70 for the round-trip from Chicago, $35 from Toledo to Benton Harbor and $37 from Toledo to Chicago. The details will be issued by the association headquarters in a bulletin now being printed. Reservations should be made with John Benham, International Register Company, 15 Throop Street, Chicago. who is secretary of the committee.

Financial and Corporate

Cleveland Dividend Not Earned

Only $910,000 Available to Pay Interest and Dividend Charges of $2,100,000 —Increase of Stockholders

Gross receipts of the Cleveland (Ohio) Railway during 1920 exceeded those of 1919 by $1,895,609, or 12.10 per cent. Operating expenses, which included an allowance for depreciation, in 1920 were $4,961,252, or 34 per cent more than in 1919. Taxes were lower by 13.75 per cent and interest was higher by 4.89 per cent. These figures were shown in the report of President John J. Stanley at the recent annual meeting of the stockholders.

The president's report showed that rates of fare were changed twice in 1920. The rate was 5 cents cash, six tickets for 25 cents, 1 cent for transfer to May 11, when it was changed to 5 cents cash, 1 cent for transfer. This continued until Nov. 14, when the rate was raised to the maximum 6 cents cash, nine tickets for 50 cents, with 1 cent for transfer.

The following table shows the average fare at each of the three rates that were in effect during the year, the passenger receipts per day at each rate, and the percentage of increase in October over April and in December over October:

Month	Fare	Increase Per Cent	Revenue	Increase, Per Cent
April.........	4.74	....	$43,825	....
October.......	5.30	11.81	48,063	9.67
December.....	5.95	12.26	51,938	8.06

The differences, however, were not due entirely to the changes in the rates of fare, for the number of fares increased by 1.47 per cent in October over April, and were 3.86 per cent fewer in December than in October.

NUMBER OF STOCKHOLDERS INCREASES

Stock of the Cleveland Railway at the close of 1920 was held by 5,531 holders, an increase of 237 over 1919. Of the stockholders 3,485 lived in Cleveland, 1,433 resided elsewhere in Ohio than Cleveland, 504 in other states and territories of the United States, and nine in foreign countries.

One quarterly dividend payment at the annual rate of 7 per cent was made during the year, but on account of suit brought to enjoin the election and decided in favor of the city by Common Pleas and Appellate Courts, the company could not continue to pay dividends at 7 per cent, and the last three payments were at the rate of 6 per cent per year.

At the referendum election on April 27 Clevelanders voted on proposals to construct subways in the downtown congested district for the benefit, or at least for the use of the company. The proposition was defeated by a vote of 28,895 to 14,092. At the same election, the proposal to authorize the issue of $15,000,000 of city bonds for the construction of the subways was defeated by a vote of 30,107 to 13,099.

During the year the company had a controversy with motormen and conductors in regard to work and wages. They demanded a wage of 90 cents an hour, or 50 per cent more than the maximum wage they were then receiving. After a series of conferences between the trainmen, city officials and company heads, the trainmen accepted President Stanley's offer of 70 cents an hour during the first three months of service, 73 cents during the next nine months, and 75 cents thereafter, with a six-hour minimum day. A new contract was signed, fixing the wages at these rates until May 1, 1921.

In concluding his report, President Stanley said:

> All authorities seem to agree that prices are coming down. Many prices have already come down. Copper and tin, exclusive of freight, are below the average prices of those metals in the ten years from 1905 to 1914. According to the Bankers' Commodity Price List the average price of all commodities on Dec. 1 was $501.75 compared with $564.01 a month before, $662.66 a year before, and $358.77 on Aug. 1, 1914. Coal is down. Wage reductions throughout the country range from 5 per cent to 60 per cent, a great majority being from 20 per cent to 25 per cent in December, and they may go lower. This means, in addition, that many men are out of work, which of course hurts the street railroad business.
>
> Predictions as to future business—building, industrial and commercial—vary. Our own big problem at this time is how to obtain funds to pay for needed extensions, additional rolling stock and other improvements. Our franchise provides that we may not pay more than 6 per cent for money to stockholders, bondholders, banks or any other persons. During the last few years money has been and it now is worth more than 6 per cent. As long as other people are willing to pay more than this rate for all obtainable money we cannot hope to get what we need. As long as investors can get a higher rate on other good securities they are not strongly tempted to buy our 6 per cent stock at par, and so, as Sir Robert Peale said of Baring, the great European banker and lord of the British Treasury, our treasurer "sits on an empty chest by a pool of bottomless deficiency fishing for a budget" for betterments.

INCOME ACCOUNT THE CLEVELAND RAILWAY. BASED ON ACTUAL EXPENDITURES

	1920	1919	Per Cent Change
Passenger revenue*	$17,072,999	$15,223,060	+12.17
Other transportation revenue	130,668	101,344	+28.90
Other railway operations	178,691	134,830	+32.53
Total operating revenue	$17,382,358	$15,459,234	+12.44
Way and structures	$2,109,294	$1,550,532	+36.04
Maintenance car equipment	1,949,887	1,452,257	+34.27
Maintenance power plant	59,021	45,062	+30.98
Power-operation	1,652,874	1,151,114	+43.59
Conducting transportation	7,042,945	5,069,703	+38.92
General and miscellaneous	2,252,030	1,714,468	+31.35
Obsolete property	498,000	619,663	—19.63
Total operating expenses	$15,564,051	$11,602,799	+34.14
Net operating income	1,818,307	3,856,435	—52.80
Taxes	1,082,185	1,254,637	—13.75
Operating income	$736,122	$2,601,798	—71.70
Non-operating income	174,196	201,711	—13.64
Gross income	$910,318	$2 803,509	—67.53
Interest and dividends	2,101,239	2,003,253	+ 4.89
Surplus (*d*)	$1,190,921	$800,256	—249.00

(*d*) Deficit. * Including employes fares.

STATISTICAL INFORMATION THE CLEVELAND RAILWAY

	1920	1919	Per Cent Change
Miles of track operated	412.71	393.68	+19.03
Revenue car miles—			
Motor cars	33,634,735	31,289,194	+7.50
Trail cars	5,791,397	5,267,780	+9.94
Interurban cars	1,462,086	1,458,721	+0.23
Express and freight, mail, newspaper and chartered cars	203,022	218,741	—7.19
Total	41,091,240	38,234,436	+7.47
Revenue passengers carried	327,840,438	291,419,501	+12.50
Transfers collected	120,156,602	109,129,292	+10.10
Total revenue rides	447,997,040	400,548,793	+11.85
Employees fares	817,409	787,018	+3.86
Dead heads	2,111,228	1,473,009	+43.33
Total rides	450,925,677	402,808,820	+11.95
Rides per car mile	10.974	10.535	+4.16
No. of trip's run	7,957,178	7,378,521	+7.83
Rides per trip's run	57	55	+3.64
Passenger revenue—			
From cash fare passengers	$15,970,086	$14,235,374	+12.19
From transfers	1,057,437	944,353	+11.97
Total	$17,027,523	$15,179,727	+12.17
Average fare in cents per revenue passenger*	5.19	5.21	—0.38
Average fare in cents per ride	3.78	3.78	0.00
Operating revenue per mile of track	$42.117	$39,268	+7.26
Operating ratio	89 2	75 0	+14.2
Taxes, per cent of operating revenue	6.24	8.12	—1.88

* Including employees fares.

Receiver Seeks Court's Advice

Desires Instruction with Respect to Preservation or Further Disintegration of Lines of New York Railways

Job E. Hedges, receiver of the New York (N. Y.) Railways, has appealed to the United States District Court for the Southern District of New York for instructions with respect to the preservation or further disintegration of the railway system now operated by him. The appeal was made on March 9. It was heard on March 14. The court directed the receiver to take no further action until May 2.

THE New York Railways system has already disintegrated to so large an extent that this has resulted in the public paying in many cases 7 cents or 10 cents for rides which had previously cost 5 cents. Unless some relief is granted, it is, in the opinion of the receiver, unavoidable that there will be a further disintegration of the system now operated by him.

The surface car lines in Manhattan would thus be split up into their component parts so that operated routes instead of being laid out for the convenience of the public and in accordance with the natural direction of travel would be laid out in accordance with the accident of antiquated franchise grants.

INCREASED EXPENSES TO PUBLIC

According to Mr. Hedges this would result in a number of railroads charging 5 cents or more for a short haul. In this connection he said:

It may be that the Broadway line will be operated in two or more sections, and the Lexington Avenue line, which now runs from the Harlem River to the Battery, will be separate companies, each running a short distance only. The result will be a hodge podge of street car lines operated independently at greatly increased expenses to the traveling public.

In facing the problems of the future of the street surface railways in Manhattan the number of people who use these lines should be considered. For the fiscal year ended June 30, 1919, there were, including transfer passengers, a total of 310,642,480 passengers on the lines of the New York Railways system alone.

Of these 204,381,002 rode on up and down town lines and the balance on crosstown lines. About one-third of the total rides were taken in the rush hours. It is inconceivable that the public would desire to have these passengers forced to use the already overcrowded subways.

Mr. Hedges' summary in part showing present conditions of property of the New York Railways from the date of receivership, March 20, 1919, to present, is as follows:

	At Appointment as Receiver	At Present Time
Avenue lines	9	5
Crosstown lines	11	6
Total track mileage operated	151	73
Total free transfer points	287	18
Total 2c. transfer points	...	70

LEASES SURRENDERED AND PROPERTY RETURNED TO OWNERS

Eighth Ave. Railroad	Aug. 1, 1919
Ninth Ave. Railroad	Oct. 1, 1919
N. Y. & Harlem Railroad	Feb. 1, 1920

The surrender of these leases, continued the summary, cut off entirely the upper West Side service of the Broadway-Columbus, Broadway-Amsterdam and Sixth and Amsterdam lines. It removed from the system the Eighth Avenue, Ninth Avenue, Fourth and Madison Avenue and the Eighty-sixth Street crosstown lines, with resulting discontinuance at all but six points of exchange of transfers between those lines and lines remaining in the New York Railways system.

LINES TEMPORARILY DISCONTINUED

Avenue C, storage battery line, Sept. 21, 1919.

Spring and Delancey Street, storage battery line, Sept. 21, 1919.

Sixth Avenue Ferry, storage battery line, Sept. 21, 1919.

Chambers and Duane Street, storage battery line, Sept. 21, 1919.

Canal Street, crosstown line, Dec. 1, 1919.

One Hundred and Forty-fifth Street, crosstown line, July 11, 1920.

Operation of Seventh Avenue—Brooklyn and Fourteenth Street crosstown lines over Williamsburg Bridge ceased, March 7, 1920.

Transfers from Staten Island ferry boat ceased Sept. 15, 1919.

Transfers with Fifty-ninth Street, crosstown line of the Third Avenue Railway systemed, ceased Jan. 30, 1921.

FUNDED DEBT

(Interest defaulted — foreclosure suits pending.)

Principal, $18,063,539, New York Railways thirty-year first real estate and refunding mortgage 4 per cent gold bonds, annual interest $722,541.

Principal, $20,609,487, New York Railways thirty-year adjustment mortgage 5 per cent income gold bonds, if earned.

UNDERLYING MORTGAGE BONDS

Principal, $5,000,000, Lexington Avenue & Pavonia Ferry Railroad first mortgage 5 per cent bonds, annual interest $250,000.

Principal, $3,000,000, Columbus & Ninth Avenue Railroad first mortgage 5 per cent bonds (foreclosure about to be instituted), annual interest $150,000.

Principal, $350,000, first mortgage 5 per cent bonds South Ferry Railroad, annual interest $17,500.

Effective Aug. 17, 1919, the wages of all employees were raised, increasing the payroll at the rate of about $1,500,000 per year as the system was then constituted.

Effective July 18, 1920, a further increase in wages added upwards of $450,000 more per year to the payroll as the system was then constituted.

The aggregate increase in the payroll of the system as at present constituted over the same system at the time of the receiver's appointment is approximately $1,575,000 per year.

The rates of wages of employees have been increased 35 per cent since the beginning of the receivership, and the rates of pay, as compared with pre-war times, have been increased by considerably over 100 per cent.

OPERATING INCOME AND EXPENSES COMPARED, DECEMBER, 1920, WITH DECEMBER, 1913

	Rate in cents per mile Dec., 1920	Dec. 1913	Per Cent Inc'se
Operating income	65.65	39.27	67.18
Operating expenses and taxes	72.51	28.19	157.22
Net result	†6.86	‡11.08	*161.91
Payroll cost, included in operating expenses	39.79	14.13	181.60

†Loss. ‡Gain. *Decrease.

TAXES

Total accrued liability for taxes, including penalties and paving charges, payable to state or city, unpaid as of Dec. 31, 1920	$3,156,029
Total taxes or other charges levied or imposed in 1920 by state or city	1,563,047

TAXES IN CENTS PER CAR-MILE

United Railways (San Francisco)	1.86
Philadelphia Rapid Transit Co.	2.19
New York Railways	4.92

Claims against New York Railways in addition to claims on mortgage bonds.

(a) Claims for accidents prior to receivership unpaid;

Claims admitted	$1,350,695
Claims disputed or in process of adjustment	$377,949
Amount claimed in pending suits for which no claim has been filed	1,079,713

(b) Contract and other claims unpaid:

Admitted	$227,874
Disputed or in the process of adjustment	114,633,905

DEFICITS

	March 21, 1919, to Dec. 31, 1920	Aug. 1, 1920, to Dec. 31, 1920
Deficit from operating	$1,386,158	$240,215
Deficit after including non-operating income and outgo, but before deducting any interest on bonds or other requirements	1,479,213	195,279
Deficit after charging interest actually paid on certain bonds	2,819,243	467,239
Deficit after charging interest in default on underlying bonds and on New York Railways first real estate and refunding bonds in hands of public	4,596,631	933,240

VALUE OF PROPERTY STILL RETAINED BY RECEIVER

Cost of pre-war prices, less depreciation	$55,173,996
Cost at June, 1919, prices less depreciation	85,887,426
Assessed value of real estate alone	20,255,700

The summary of the report is concluded with a statement of the jurisdiction over fares as exists at present. The receiver says that he has under consideration the surrender of the leases of the following lines: Broadway and Seventh Avenue, Sixth Avenue, Christopher and Tenth Street, Bleecker Street and Fulton Ferry.

California Tax Bill Passed

Extravagant State Administration Calls Upon Corporations to Pay—Governor Glad People Rule

The California State Legislature on March 5, after passage through the Senate, finally passed through the Assembly by a vote of fifty-four to twenty-six the King tax bill to raise a $15,000,000 deficit in the state budget for the next two years. Governor Stephens signed the King bill the same day.

The new law will increase rates of taxation against numerous larger corporations. The tax rates of the utilities, for instance, will be increased by about one-third. The money thus realized, it has been explained by the State Board of Equalization, will be used to meet increased costs of state administration. Opponents of the bill held that the proposed increase in taxation could be avoided by resort to economies in the administration of public affairs. On March 7 one large light and power corporation made application for an increase in rates as the only means available to it for meeting the added tax burden.

In commenting on the passage of the King tax bill Governor Stephens said: "Thank God. The people have won a great victory. They still rule California."

Further consideration is to be given to economies suggested by the utilities' representatives while debating against the bill during the legislative

sions. Paul Shoup, vice-president of
Southern Pacific Company and
esident of the Pacific Electric Rail-
y, was invited to address the assem-
on what economies he could suggest
vard reducing state expenses, and ex-
vernor Frank K. Lowden of Illinois
s to tell the California State Leg-
ature how he reduced expenses in
conduct of the affairs of Illinois.
x Thelan, formerly president of the
lifornia State Railroad Commission,
ll also address the legislators on
ssible reductions in the proposed
,000,000 budget for the next two
ars.

Mr. Thelen proved to the Legisla-
e that $8,000,000 could be saved
thout cutting anyone's salary, dis-
ssing any employees of the state, or
olishing any of the state's commis-
ns or agencies. He held the floor
several occasions during the debate
the King tax bill and offered to
ow the legislators and the Governor
at such a saving could take place.

Attorney General Webb has said that
measure may not be legal. This
inion is shared by many prominent
wyers and the measure may be at-
cked in the courts.

The proposed legislation was reviewed
the ELECTRIC RAILWAY JOURNAL for
arch 5, page 464. It was stated at
at time that public service corpora-
ns considered the bill an unfair meas-
e as they were already taxed more
proportion to value than other prop-
ty. The utilities also advanced the
ea that additional taxation would
rce them to advance their rates in
der to show earnings which would
tract capital.

6 Profit in Seattle in January

According to the report prepared by
e Seattle Municipal Railway officials
e number of passengers riding on
attle's Municipal Street Railway in
nuary—in which month increased
res went into effect—decreased 897,-
9 compared with the month of Decem-
r. The total number of fares for the
onth was 6,625,924, as against 7,523,-
3 in December. This was a decrease
11.9 per cent.

Operating under the 8⅓ cent fare, the
unicipal Railway in January showed
net gain of $12,783, despite the
arked slump in passenger traffic. This
t profit includes all interest charges
d $56,719 depreciation. Further
onomies were put into effect in Jan-
ary. The payroll was trimmed, serv-
e was reduced and other operating
sts were cut.

The total expenses for wages and op-
ation were $376,216 in January. In-
rest charges and depreciation further
creased this total to $505,553. Reve-
ues were $518,337, leaving a gain of
2,783 without deducting a month's
ond redemption charge. With this
arge allowed there was a net gain of
88.64. Revenues increased $35,842
ver December, and operating expenses
ecreased $16,152.

Present Value Theory Rejected

Texas Court Rejects Special Master's Finding—Galveston Value Fixed at $1,500,000

The Galveston (Texas) Electric Company has lost its fight for a 6-cent fare. In the United States Court for the Southern District of Texas, Judge J. C. Hutcheson, sitting at Houston, has handed down an opinion refusing to enjoin the city of Galveston from enforcing its ordinance directing the company to discontinue collection of 6 cents from street car patrons and to collect the old fare of 5 cents. In rendering his decision, Judge Hutcheson ruled contrary to the finding of Judge Henry J. Dannenbaum, master in chancery.

THE court gives two basic principles upon which it holds that rate controversies rest:

1. The principle which adheres in sovereignty.
2. The provisions of the fourteenth amendment, which guarantees equal protection of the laws and which inhibits the deprivations of property without due process of law.

Some of the salient points of the court's written order follow:

Both parties agreed that the property ought to have cost $1,715,825 on the basis of prices prevailing at the time it and its various units were constructed. The company contended that this value should be appreciated by a sufficient percentage factor to make the agreed value actually conform to present-day value of the plant. The city contended that the agreed value should have been taken as the basis of the value for rate-making purposes of the depreciable property, less a reasonable and adequate deduction for accrued depreciation.

The view of the master is adopted that the prices obtaining at the time of the valuation were transitory.

The master's allowance of $530,000 for development cost or going concern is disallowed, because:

> A court in a rate case has nothing to do with any increment to the actual value of the plant by the successful operation of it, nor in a case of valuation, where the cost of the plant and its historical development is determined, does the court add anything to its capitalization for rate-making purposes for its unsuccessful years, nor deduct anything for its successful years. In short, when going concern is stripped of its involvement and obscurity, its attractive names and titles, it presents itself on the one hand as good will, or an effort to capitalize errors and misfortune.

The statement that ". . . the constitution guarantees it (the plaintiff) a fair return upon the value of its property" is denied with the assertion that the constitution protects against legislation which would deprive the company of the right to charge rates adequate to produce a fair rate of return. Says the court:

> It certainly can not be that the courts intended, in declaring that the rights to a fair return could not be abridged, to create a more favored class out of public utility concerns, so as to allow them to receive their 8 per cent free of income tax while all other persons in the vicinity who receive the same per cent have to pay it.

From the agreed historical reproduction cost of the property actually in service of $1,715,825, disallowing the grade raising, brokerage and engineering costs, the court takes the base value of the property as $1,573,544. To the base value 33⅓ per cent of depreciable items is added, deducting $282,000 for the item of working cost, real estate and additions to the property since Jan. 1, 1915, the value of the depreciable items on the basis of historical reproduction cost is set by the court at $1,291,325.

Appreciating these items as the master did by 33⅓ per cent or $430,441, the court reaches a total of the present-day value of depreciable items of $1,721,766. Then restoring the items aggregating $282,000 the undepreciated value of the plant is given by the court as $2,013,985, which closely approximates that of the master which was $2,167,805. Deducting the accrued depreciation of $520,000, adding nothing for going concern, the court values the plant at $1,493,985, for rate-making purposes. The net return of $73,082 on the $1,500,000 valuation is approximately 5 per cent, and less than the law regards as fair.

However, the court finds that for the last six months since June 30, 1920, the property has been producing revenue at the rate of $618,000 per annum, as against the return of $548,477, which the master took as the basis of his report, and unless properly chargeable operating costs and maintenance have increased the earnings will be adequate to save the ordinance from the confiscation charge, for deducting the ascertained total of expenses, including the depreciation allowance, namely $475,395, from the estimated operating total of the fiscal year ending June 30, 1921, there is a net revenue of $142,605, or approximately 9½ per cent of the valuation.

The Galveston Electric Company sought an injunction against an ordinance passed by the Board of City Commissioners in 1919. The previous city administration permitted the company to charge 6 cents, effective Sept. 19, 1918. The present city administration, through ordinance, reduced this to 5 cents, effective June 5, 1919, so that the 6-cent fare was in effect less than four months. With the filing of the suit came the naming of the master in chancery, Henry J. Dannenbaum, who recommended that the rate of return was "insufficient and confiscatory." The master found that for the year ended June 30, 1920, the company earned 1.86 per cent on the value of the plant, but the court shows an earning of 9½ per cent on a valuation of $1,500,000, instead of the suggested valuation of $2,167,805.

Mitten Management, Inc., Organized

Mitten Management, Inc., has been chartered to engage in the business of managing, or acting as managers, of the affairs and operations of public utilities. The corporation is also authorized to carry on the business of consulting, industrial and contracting engineering in all its branches, including the construction, organization, operation and management of industrial plants and other business undertakings.

The personnel of the organization is as follows: President, Thomas E. Mitten; vice-presidents, C. J. Joyce, W. C. Dunbar, G. A. Richardson, P. J. Mitten and H. G. Tulley; secretary and treasurer, A. G. Mitten; assistant secretary and treasurer, R. F. Tyson. The directors are T. E. Mitten, C. J. Joyce, W. C. Dunbar, G. A. Richardson, P. J. Mitten, H. G. Tulley, and A. A. Mitten.

Mitten Management, Inc., whose offices are at 1520 Spruce Street, Philadelphia, last month closed a contract whereby it undertakes the management of the entire city and interurban railway properties of the International Railway, Buffalo, N. Y.

Security Holders Accept Reorganization Plan

The plan for the reorganization of the traction properties at Providence, R. I., into the United Electric Railways has been accepted by the bondholders of the United Traction, Rhode Island Suburban, Pawtuxet Valley and Cumberland Street Railways and by the United Traction stockholders.

Under the plan those security holders who have never deposited their stock or bonds with their protective committees have a further period, up to March 20, during which they may come into the reorganization by depositing their securities with the proper depositary.

The next step in the reorganization will probably be for the joint reorganization committee to declare the reorganization plan and agreement adopted and in operation. Steps will then be taken, it is understood, to press foreclosure proceedings on the various properties.

The terms of the proposed reorganization were reviewed in the ELECTRIC RAILWAY JOURNAL for Feb. 19, page 381.

$1,305,553 Earned by Iowa Interurbans

The forty-second annual report of the Board of Railroad Commissioners of Iowa contains statistics for the year ended Dec. 31, 1918. The status of the interurban companies, capitalized at $77,640 per mile, for the above period follows:

	1918	1917
Number of companies........	14	14
Mileage—single track........	512.13	510.69
Gross earnings from operation	$5,408,175	$4,096,597
Operating expenses.........	4,102,622	2,707,527
Net earnings from operation..	1,305,553	1,389,070

Financial News Notes

Sale of Real Estate Postponed Again.—The sale of the New York (N.Y.) Railways real estate under the orders of the court according to the provisions of the first real estate and refunding mortgage has been adjourned until April 6.

Electric Line Removed.—The structure of the Babylon (L. I.) Railroad is being removed and shortly there will be no trace of this Long Island electric line which extended from Amityville to Babylon. The road suspended service on May 15.

Change in Name Announced.—Announcement has been made that the Public Utilities Company, Evansville, Ind., has changed its name to the Southern Indiana Gas & Electric Company. The company operates 68 miles of electric railway.

Threat of Suspension at Middletown.—Officials of the Wallkill Traction Company, Middletown, N. Y., have threatened to "scrap" the railway and stop operations unless relieved of paying for repaving the streets between its tracks. The company has suggested that the city of Middletown obtain an enabling act to relieve it of this expense, which it protests it cannot afford.

$6,154 Loss in Month on Tacoma Line.—In the January report issued by City Comptroller John M. Roberts of Tacoma, Wash., the operating revenue of the Tacoma (Wash.) Municipal Railway is given as $9,139, some $2,000 less than receipts last year, largely due to reduced working forces of tideflat industries. Operating expenses, including a $2,000 depreciation charge and insurance charges, were $11,839, leaving an operating deficit of $2,700. Interest on bonds, tax charges and other items of $3,397 bring the total deficit to $6,154. The deficit for the four years of operation now amounts to $166,522, which includes depreciation and other charges.

Successor Company Being Formed.—The Northern Rhode Island Railway, Providence, R. I., is being formed for the purpose of acquiring the Chepachet branch of the Providence & Danielson Railway. This branch has not been operated for a number of months. It is the purpose of the new company to lease its plant for operation to the United Electric Railways. The Chepachet line has always been dependent for its power upon the Narragansett Electric Lighting Company. In the bill to incorporate the new company there is a section giving to it the power to manufacture power for its own use and for sale to private consumers in the towns of North Providence, Johnst
Smithfield, Gloucester and Burrillvi

Approval of Refunding Sought.—E
penditures of $421,900 for impro
ments of the gas, electric and railw
utilities at Evansville within the n
two years is planned by the Pub
Service Corporation, according to co
pany officials who appeared before
Public Service Commission recent
The commission was asked to author
the sale of $1,736,300 of securities
refund maturing obligations and
meet proposed expenditures. Offici
predicted the securities would have
be sold at 80 cents on the dollar.
bonds would bear 6 per cent inter
and mature in 1929.

Springfield Has Surplus.—Clark
Wood, president of the Springfi
(Mass.) Street Railway recently
ported on the company's showing
1920. Travel was very heavy as e
denced by an increase of 6,000,000 p
sengers carried over the previous ye
The equipment of the company
increased by the addition of twe
new one-man cars and additional tra
age laid. As for the revenue of the co
pany Mr. Wood states that an adva
has been made over 1919, the ea
months of the year before the bu
ness depression was felt, showing
best increases. The mild winter
lack of heavy snowstorms saved
railway heavy expense.

Bill Reported for Successor Compa
—The committee on railroads of
Connecticut Legislature has repor
favorably on a bill incorporating
Eastern Connecticut Railway to p
chase all the present line of railw
now owned by the Shore Line Elect
Railway through Norwich, Prest
Ledyard, North Stonington and St
ington to the Connecticut-Rhode Isla
line at the Pawtucket River and c
necting with the tracks of the N
York, New Haven & Hartford Railr
company at Brewster's Neck.
capital of the company is $50,000 w
the right to increase to $500,000.
incorporators are: Robert W. Perki
Norwich; Edward M. Day, Hartfo
and Charles B. Whittlesey, New Lond

Cincinnati Conferences Being
ranged.—Preliminaries are being
ranged for the conferences to be
by the Ohio Traction Company and
Cincinnati Street Railway in conn
tion with the refinancing and possi
reorganization of the properties as
quested in a letter to the compa
from Williams C. Culkins, street
way director. The Ohio Traction C
pany, holding company of the Cin
nati Traction Company, has appointe
committee consisting of Louis J. Ha
C. J. Livingood and Walter A. Dra
with W. Kesley Schoepf as ex of
member. The Cincinnati Street R
way has appointed a committee
sisting of C. W. Dupuis, George Le
and B. L. Kilgour, ex officio. The c
mittees will have their first confere
on the return to the city of W.
Schoepf, president of the Cincin
Traction Company, who is in the E

Traffic and Transportation

More Five-Cent Zones

any Brooklyn Riders Now Paying Two or More Fares Under Old Franchise Grants

The zone system is to be applied to ne more surface lines operated by indley M. Garrison, receiver of the rooklyn Rapid Transit Company. his means that approximately two-hirds of the 150,000 passengers car-ed daily by these lines will pay 10 ents for a ride instead of 5 cents.

COMMISSION'S VIEWS EXPLAINED

Authority for this action has been btained by Mr. Garrison by a decision Public Service Commissioner Alfred . Barrett that he would not extend e order suspending the new tariffs led by the surface line companies. he order expired at midnight on arch 12. A long statement, explain-g Mr. Barrett's position, was made ublic. This says that the action of e commissioner is based on the re-ent decision of the Court of Appeals hich sustained the contention of the rooklyn City Railroad that it had the ght to charge a double fare for rough riders on the Flatbush Avenue ne, and the success of other trolley mpanies in similar litigation. On is point Mr. Barrett said:

> The effect of these decisions was to leave e Public Service Commission without ower to increase rates and in certain ses without power to prevent a company om itself increasing them.

RECEIVER INSISTS ON ZONE PLAN

That Receiver Garrison intended to sist upon his right to establish the one system on the surface lines under s control was made clear in an argu-ent before Federal Judge Mayer on eb. 14. It was indicated at that time hat the old city of Brooklyn would onstitute one fare zone and that each ne of the towns which now compose e city would constitute an additional are zone.

The new schedules were filed by Mr. arrison on Dec. 14 last and later they ere suspended by an order of the com-ission until Jan. 12 and then until arch 12. In the meantime, the com-ission held many public hearings, the esult of which, according to Commis-ioner Barrett, was to prove "con-lusively that the companies were all osing money at the present rate of are, and their legal representatives tated on the record that unless they ere allowed to charge additional fares pon the zone system they would be ompelled to close down the operation f the lines."

Justice Manning of the Supreme ourt in Brooklyn refused on March 5 to issue an injunction to the city estraining Lindley M. Garrison, as re-eiver of the four surface line companies of the Brooklyn Rapid Transit system, from putting into effect immediately the double fare charge authorized by Mr. Barrett. Instead, he issued an order requiring Mr. Garrison to show cause, at 2 o'clock on March 18, why the injunction should not be issued.

Ten-Cent Fare on Interurban

Passengers riding on interurban cars within the city of Cleveland, Ohio, began paying 10-cent fares on Dec. 26, 1920, with 1 cent additional for transfer to any intersecting city lines except where the right of free transfer is stipulated in suburban grant. This fare is the result of the action taken on Dec. 8 by the Cleveland City Council in adopting a resolution designating the cars of the Cleveland & Eastern Traction Company, the Cleveland & Chagrin Falls Railway, the Cleveland Southwestern & Columbus Railway, the Lake Shore Electric Railway, and the Northern Ohio Traction & Light Company as special cars and express passenger cars.

The right to do this is contained in section 23 of the renewal grant of April 7, 1919, authorizing the company to operate express passenger service and other special cars at rates to be fixed from time to time by the Council of the city of Cleveland not lower than the rate in force in the city.

Under the terms of the contract made with the interurban railways in November, 1897, to continue for twenty-five years, the Cleveland Railway is entitled to collect and retain (except in two cases where a division is made with the interurban companies) all of the fares collected by it on the interurban cars in its territory; it pays the wages of the crews while the cars are under its control, and it pays the interurban companies 2 cents for each mile run by their cars on its tracks. Under these contracts the company will receive all of the 10-cent fares except in the two cases mentioned, in which a division must still be made with the two interurban companies.

The Cleveland Railway does not anticipate that this legislation will increase the number of riders, although it may increase the amount of revenue. Passengers coming to the city may leave the cars of the interurban company at the junction of the tracks of those companies with the tracks of the Cleveland company and ride in on the city cars at whatever rate of fare may be in effect. The same is true on outbound trips, when passengers may ride to the limits of the urban fare before boarding the interurban cars.

The report of the railway for the year ended recently is reviewed elsewhere in this issue.

Eight Cents in Denver

Court Holds City Broke Franchise Contract by Allowing Temporary Six-Cent Fare

Patrons of the Denver (Col.) Tramway commenced paying an 8-cent fare on March 15. Metal tickets are sold in quantities of two or multiples thereof at the rate of 7½ cents each. The half-fare rate for children between the ages of six and twelve was increased to 4 cents with metal tickets sold in quantities of four and multiples thereof at 4¾ cents each.

The higher rates of fare were announced by Receiver Stenger under a decree issued by Judge Robert E. Lewis of the United States District Court, District of Colorado, wherein the 6-cent fare was held to be confiscatory and the city of Denver was enjoined from enforcing the collection of same and from interfering with the collection by the receiver of the higher rates.

The fare increase action is the result of proceedings instituted by Mr. Stenger on Feb. 11, at which time application was made to the court for permission to increase the adult fare rate from 6 cents to 10 cents and the children's rate from 3 cents to 5 cents. The case came up for hearing on March 1 and following the closing arguments on March 10 Judge Lewis immediately rendered his opinion granting the receiver permission to increase the fares. The Judge declared that it was not within his power to set the rate of fare to be charged, but that Mr. Stenger in his capacity as an officer of the court has the right to raise fares. The court allowed, however, that it would restrain Mr. Stenger to what it considered a reasonable figure and established 8 cents as the maximum fare which could be charged at this time.

FRANCHISE WAS NEVER A CITY CONTRACT

Judge Lewis, in rendering his opinion, stated that he did not think the tramway franchise ever constituted a contract with the city. Of one thing he was certain and that was that if there ever was a contract between the city and the company the existence of same came to an end when the city in the exercise of its governmental powers passed an initiated ordinance for a 6-cent fare and thereby changed the rate of fare from the rate contained in the franchise.

Application by the city of Denver for a stay of execution pending appeal was denied. The City Attorney thereupon gave notice that the case would immediately be appealed to the United States Circuit Court of Appeals. Pending final decision receipt slips showing rate of fare paid will be issued.

Judge Lewis, in signing the decree on March 12, declared that the city charter provisions under which the city of Denver regulates public utility rates by initiated ordinance are unconstitutional because they deny due process of law.

More Five-Cent Fares

Boston Elevated Reduces Fare 50 per Cent on all Main Surface Routes from Everett Station

The Boston (Mass.) Elevated Railway plans to establish a new system of fares on March 26 on all surface routes operating in the cities of Malden and Everett. Heretofore fares have been 10 cents with free transfers at all intersections to connecting routes.

LOCAL FARES FIVE CENTS

Under the new plan all local fares will be 5 cents, and transfers heretofore issued will be eliminated except to shuttle cars that will be operated on parts of two routes that formerly ran through to Everett station.

The fare to Boston and other points reached from the rapid transit lines will still be 10 cents with universal transfers as heretofore.

Seven routes will be operated to the Everett elevated station. Shuttle cars will take the place of two former through routes and service on the end of another will be discontinued.

Under this system the pay-leave plan will be operated on inbound trips to Everett station. Passengers leaving cars before reaching that point will pay 5 cents and all those entering the station will pay 10 cents the same as if they entered the station from the street. Passengers originating on shuttle cars will use a valued continuation ticket either in full or part in payment of fare.

Passengers on outbound trips boarding cars in Everett station pay nothing for fare on the surface lines. Passengers, however, boarding cars on the street pay 5 cents on boarding the car. Continuation tickets are issued by conductors when the passengers leave the car at the two junctions from which shuttle cars operate.

During the night when elevated trains are not in operation surface cars will run through to Sullivan Square or Boston. On these cars 10-cent fares will be charged to all passengers at the time of boarding. The fares to Everett station cars will be the same during the twenty-four hours of the day.

TRUSTEES WILL MAKE REPORT

In spite of the fact that the trustees are proceeding with the establishment of 5-cent fare lines as indicated above when short riding occurs or may in the opinion of the management be developed, the Massachusetts Legislature has seen fit to take a hand in the problem and has passed a resolve directing the trustees to investigate and report on the advisability of establishing a 5-cent fare on certain lines operating from Dorchester and South Boston localities into the business section of Boston where a 10-cent fare is now charged.

During the course of the debate, the act under which the trustee method of control was established in 1918 was bitterly attacked, and charges were made that certain members of the Legislature then in session profited by purchase of Boston Elevated stock just before the act was passed. Numerous amendments were offered in an attempt to include other localities in the proposed investigation, but were all defeated. It was claimed that the trustees had ample authority for making such an investigation without the necessity for specific legislative enactment, but nevertheless the bill was passed by a large majority. A report is required on or before April 15.

The trustees have already established two 5-cent fare lines, one operating in from South Boston and the other from Charlestown.

Six-Cent Fare Asked in Indianapolis

Company Claims One-Cent Transfer Charges Insufficient to Meet Increased Expenses

A 6-cent fare and a 2-cent transfer charge, with provision for the sale of twenty tickets for $1, were asked in a petition for an emergency increase in rates filed by the Indianapolis Street Railway with the Public Service Commission on March 14. The present fare is 5 cents, with a 1-cent transfer charge and no provision for the sale of tickets at a reduced rate.

The petition states that the 1-cent transfer charge, which has been in effect since Dec. 20, 1920, is insufficient to meet the increased operating costs and fixed charges of the company, which caused a petition for emergency relief last fall. Due to a decrease in the number of revenue passengers since Dec. 20, 1920, the company will face a cash deficit of more than $300,000 on May 1, without providing for betterments or improvements, the petition states.

The 1-cent transfer charge, which was originally established for an observation period of seventy-one days, was continued by the commission recently, pending further consideration of the case. In connection with the present petition, the company submitted a detailed financial statement, showing the revenues obtained under the operation of the 1-cent transfer charge and indicating the financial situation of the company.

Samuel Ashby, city corporation counsel, said that the petition was filed without the knowledge of city officials. He pointed out that the company was to have made a report on March 1 on the revenues accruing from the 1-cent transfer charge, but that upon the request of the railway the Public Service Commission later granted the company until April 1 to make the report.

The Indianapolis Street Railway is still operating under its city franchise. Under the terms of the Knapp law, which permits utilities to surrender their franchises and operate on an independent permit under the jurisdiction of the Public Service Commission, the company may abandon its franchise. This action cannot be taken until the 1921 statutes are published. The Knapp law contained no emergency clause.

Louisville Injunction Argued

Hearing in that City on March 17 on the Plea of the City Against Present Seven-Cent Fare

The United States District Court of Appeals set March 17 as the date for hearing the appeal case of the city of Louisville on the injunction granted the Louisville Railway to prevent collection of a 7-cent fare. A motion will also be filed by the city to require the railway to issue receipts pending final settlement of the case.

March 17 was set following the plea made on March 9 by J. S. Lawton, city attorney of Louisville, before the Cincinnati court. Churchill Humphrey, of the company, asked for an April assignment of the case, to give more time to working up material.

One of the first questions to be decided is whether the franchises under which the company is operating are contractual or regulatory.

There have been a good many jitneys on the streets in Louisville as a result of the 7-cent fare. Licenses are being issued to jitneys under the taxi ordinance instead of the jitney law. This results in some of them operating without even a surety bond. Many jitney operators are poor drivers, and accidents have been increasing at an alarming rate.

INCREASED FARES NOT REFLECTED IN REVENUES

Although the increase from 5 cents to 7 cents in fares in Louisville should figure about 40 per cent, actual increased revenues are only about 18.4 per cent according to company officials, due to loss of short hauls and competition from the jitney bus.

The Kentucky Railroad Commission has authorized the Louisville & Interurban Railway, owned by the Louisville Railway, to increase interurban fares 2 cents, to bring the haul within Louisville up to the city rate of 7 cents. Those who buy present commutation books will not be affected. The rate outside of the city remains at about 3 cents a mile.

The Louisville Railway has flatly refused to consider the suggestion of City Attorney Lawton that receipts be issued with 7-cent fares, so that refunds may be made in the event that the upper courts give an opinion against the company. The proposal was that each ticket strip contain a receipt, so that only buyers of strips would get receipts.

New Transfer System in Los Angeles

A new transfer to simplify the present system and speed up the loading of cars is to be introduced by the Los Angeles Railway April 3, according to an announcement made by G. J. Kuhrts, general manager. The new plan is expected to be of special benefit in traffic distribution as it will give car riders a wider choice of transfer points than exists at present, thus reducing the number of people boarding cars at busy intersections.

The new transfer will have a coupon ttached. When presented on the second car the conductor will receive the ransfer as at present, but if the passenger wants another transfer the receiving conductor will detach the coupon and return the body of the slip o the passenger and this slip will be ood for the third ride. This plan will ot affect passengers on shuttle cars s shuttle lines are considered as continuations of the main line with which hey connect. A special type of transfer will be used for shuttle cars so a assenger will be entitled to full transfer privileges after boarding the main ine car.

Different colors will designate whether he transfer was issued on an "in" or out" trip.

Cars south and west bound through he business district will be designated s on the "in" trip and "out" trip will e north and west through the downtown zone. Three o'clock p.m. will be he dividing point between "a.m." and p.m."

LOADING OF CARS WILL BE SPEEDED

When the new transfer is introduced pril 3 it will not be necessary for passenger to state the direction in which he wishes to travel on the second ride. He will merely say "transfer" to the conductor and will receive slip.

Transfers will be good on connecting or diverging lines except at oints specified on the back of the ransfer. Under the wider choice of ransfer points a passenger may board he second car at any point where it rosses, enters, or diverges from the ine on which he paid the fare. Under he present system one point is designated and change from one line to nother must be made at that one point nly.

Through Railway-Omnibus Routing in London

The London County Council has ecided to enter into an agreement with the London General Omnibus Company for through bookings between the tramcars and the omnibuses. In principle this applies to all the tramway deadends in the central area, but as an experiment it is only at first to be tried at the tramway terminus at Victoria Station for twelve months. The through tickets between car and bus or *vice versa* will not apply to workmen's fares nor to the cheap midday fares. The company is, however, prepared to provide early morning omnibuses to connect with the workmen's cars run by the Council. That any step should be taken between the two big rival undertakings to promote co-ordination of traffic is noteworthy, because the County Council has hitherto stood aloof in proud isolation from the company.

The new scheme may be regarded as the outcome of two things. Some months ago, at the instigation of the Minister of Transport, conferences were begun between representatives of the two bodies with the object of traffic co-ordination. Then in the autumn, when a committee of the House of Lords rejected a scheme of the County Council for powers to run omnibuses to link up the tramway dead-ends in central London, the committee suggested that the omnibus company might provide these services. It recommended negotiation on the subject. The first fruits are now apparent.

Transportation News Notes

Ten Cents in Vancouver.—The Public Service Commission of Washington has given permission to the North Coast Power Company, which operates the railway line in Vancouver, Wash., to increase fares to 10 cents. Eleven tickets will be sold for $1. The old rate was 7 cents.

Protests Interurban Rise.—Protests against increasing the fare on the Daisy interurban from 7 cents to 10 cents were heard recently at New Albany, Ind., by a special examiner of the Interstate Commerce Commission. The Daisy line is operated by the Louisville & Northern Railway & Lighting Company.

Increased Rates in Effect.—The Trenton, Bristol & Philadelphia Street Railway has been granted permission by the Public Service Commission of Pennsylvania to increase its fares from 7 to 8 cents between Morrisville, Trenton and Torresdale and intermediate stations. Special car rates are also advanced.

Jitneys Succumb Under Regulation.—New jitney regulations put into effect at Providence, R. I., on March 1 resulted in 127 operators of these vehicles withdrawing from service. The conditions under which the jitneys have been permitted to run were tightened as one of the steps in securing the reorganization of the electric railways in Providence.

Jitney Regulatory Bill Passed by House.—The Connecticut House has passed a measure providing for regulation by the Public Utilities Commission of all jitneys, subjecting them to supervision as to routes and rates similar to that under which electric railways are operated. The measure requires buses to be provided with certificates from the commission which correspond to the franchises of the street car companies.

New Rate in Effect.—The Seattle-Everett Interurban Railway, Seattle, has recently put into effect a new rate schedule which effects an increase of 3 to 4 cents in fares between Seattle and intermediate points, but does not affect the one-way or round-trip fare to Everett. The fifty-ride monthly ticket sold to Everett commuters is abolished and a thirty-ride ticket substituted. Commutation fares are not increased for the stations near Everett.

Ten-Cent Fare in St. John.—A 10-cent cash fare went into effect on the lines of the New Brunswick Power Company operating in St. John, N. B., on Jan. 10. Tickets are sold three for 25 cents, or fourteen for $1. There is no additional charge for transfers. F. R. Ross, president of the company, following a meeting of directors, said that he hoped the new rates would reestablish the standing of the company's securities so that it could secure new capital for improvements.

Jersey Jitney Decision Appealed.—The Public Service Railway, Newark, N. J., has filed in the Court of Errors and Appeals an appeal from the Court of Chancery decision which held that the jitneys have rights in streets occupied by electric railways. The public Service Railway has thirty-six suits pending to restrain the jitneys of various municipalities from operating on streets in which the company has franchises, and the suit started a few days ago carried with it indirectly a decision that will rule each of these cases.

Akron Council Again Petitioned.—The Northern Ohio Traction & Light Company, Akron, Ohio, has again petitioned the City Council for permission to increase its fares. The company was granted a 5-cent fare in July, 1920, pending the drafting of a new franchise. The city and the company have been unable to agree upon the terms of a proposed new contract. The company in its letter to the Council states that in three months the income has failed to meet the actual operating expenses by $96,837. The company further adds that the situation, which was serious six months ago, has now become grave, and in order to continue service material increases will be required.

Fake Claim Operator Caught.—On Jan. 23 a conductor on one of the Public Service Railway lines operating in Camden, N. J., reported that a negro giving the name of Charles Gotdenues had slipped and fallen in a car. At the hospital the man said he was a fireman employed on the White Star Line. On the following day he presented a claim at the division claim office. The suspicions of the claim department were aroused and fraudulent records looked up. Therein appeared a notice from the Claim Agents' Association under date of November, 1917, warning of one Victor Lamott, alias several other names, colored. After further investigation a warrant was issued against this Public Service Railway claimant and he was arrested on a charge of attempting to obtain money under false pretences. He admitted that he had made claims against the Philadelphia & Reading road in Philadelphia, the Pennsylvania at Harrisburg, Pa., and at the Thirty-fourth Street Terminal, New York, the latter on Jan. 8 last. He was tried as Frank Smith and sentenced to six months in the Camden County jail.

Personal Mention

Workers Pledge Pay

Men Under B.ll Boyce Respond with Loans to Meet Railway's Interest Payment

Few men in any walk of life have had any greater tribute paid to them by their employees than has W. H. Boyce, general manager of the Beaver Valley Traction Company, New Brighton, Pa. Men there are who have received from their employees sincere tokens of esteem in the form of gifts of a personal nature or other memorials purchased through subscription, but Mr. Boyce has recently had his men put their personal funds at the disposal of the railway itself.

TEN DOLLARS FROM EACH EMPLOYEE

To meet the deficit each employee of the companies of which Mr. Boyce is operating head has agreed to loan the sum of $10 from his semi-monthly pay on the first of four such payments, the total of which, with reduction of expenses, is expected to meet the immediate pressing obligations of the Beaver Valley Traction Company and Pittsburgh & Beaver Street Railway.

Mr. Boyce, at three department meetings of the employees, explained the exact financial condition of the traction interests and the response was spontaneously unanimous. Mr. Boyce gave an estimate of the probable deficit for March of $4,441, and with a probable shortage, with all obligations met, by the last of April, of $27,441, but that by deferring certain payments the shortage the last of April, which it would be necessary to make up in some manner, would be $7,716.

It was declared that if each employee who is able would lend the company $10 per pay for the next four pays, or $40 each, it would be possible to meet the situation for the next two months. Employees making the loans were assured that they would not only be given a receipt showing the payments but would receive interest at the rate of 6 per cent when the money was paid back during the months of June or July. Several offers were made of amounts from $80 to $1,000.

183 VOLUNTEERS

Mr. Boyce has long had the reputation of being one of the ablest handlers of men in electric railway work. This vote of confidence in him, one of the very first of its kind, bears witness to the correctness of this estimate. Out of 187 employees 183 volunteered their pay, accepting Mr. Boyce's say so as a pledge for the return of their money. The four employees who were not able at that time to loan the amount requested said that financial troubles of their own prevented them from doing as they wished. However, in all four cases the individuals made known to Mr. Boyce their sincere intention of loaning the desired amount as soon as circumstances would permit.

Mr. Pattison to Work on Electrification of Illinois Road

Hugh Pattison, until recently connected with the heavy traction department of the Westinghouse Electric & Manufacturing Company, engaged in making special engineering studies under the direction of F. H. Shepard, has resigned to accept a position with the Illinois Central Railway, in connection with the electrification of that road. At one time Mr. Pattison was engineering assistant to Frank J. Sprague, vice-president and technical director of the Sprague Electric Company, in New York. This association continued until 1903, during which time Mr. Pattison assisted in equipping and operating multiple-unit control on the Boston elevated and Brooklyn railroads. In 1905 Mr. Pattison joined the Westinghouse, Church, Kerr & Company, as an engineer, and from that time until 1911, during the electrification of the Pennsylvania tunnel into New York, he was assistant engineer of the electric work for George Gibbs, consulting engineer.

A little later he had charge of the electrification of the West Jersey & Seashore Railroad from Camden to Atlantic City. An experimental single-phase electric railway on the Long Island Railroad was also built by him and numerous locomotive tests on the West Jersey & Seashore Railroad were carried out under his supervision. He was graduated from Johns Hopkins University, electrical engineering course, in 1892.

New Commissioners Named

Governor Edwards of New Jersey announced on March 14 that he would, in accordance with the provisions of Chapter 36 of the new public utility bill recently passed over his veto, submit to the Senate the following names of membership of the new board: James A. Hamill of Hudson, formerly Assemblyman and Congressman for twelve years, whose term only recently expired; Joseph S. Hoff of Mercer, former Civil Service Commissioner, president of the National Bank of Princeton and of the Princeton Savings Bank; Harry Bacharach, twice Mayor of Atlantic City, at present president of the Marine Trust and director in several other mercantile institutions.

Two of the men named are Democrats and the other is a Republican. The term of Commissioner Hamill will be for six years, Commissioner Hoff for four years and Commissioner Bacharach for two years. The new law provides salaries of $12,000 for each member. The new commission will be ready to function upon its confirmation by the Senate.

Mr. Haynes Retires

Member of Indiana Commission Resigns to Take Up Law Practice in Indianapolis

Paul P. Haynes of Anderson, Ind., a member of the Public Service Commission of Indiana, has resigned his position, effective March 31, it was reported among Mr. Haynes' friends. It also is understood that Governor McCray has offered the position on the commission to George M. Barnard of Newcastle, and that Mr. Barnard will accept the place.

HIS ATTITUDE TOWARD UTILITIES

Mr. Haynes is serving his second term as a member of the commission. His present term would not have expired for about three years, but his friends have understood since late last year that he would resign some time in March of this year and engage in public utility and law practice in Indianapolis, after several months of special work for certain corporations in Mexico. James P Goodrich, then Governor, reappointed Mr. Haynes last year to another four year term. He is the youngest person ever to serve on the board. Mr. Haynes and Mr. Barnard, both lawyers, have been prominent in Republican politics

Mr. Haynes has made an enviable reputation in the public utility field, the electric railway field, especially, because of the fair and common-sense stand he has taken regarding the utilities. He clearly stated his attitude at the annual meeting of the Indiana Public Utility Association, which was reported in the ELECTRIC RAILWAY JOURNAL for Jan. 22. At that time Mr Haynes said that the interests of the public utilities and of the public are so inextricably associated that what is good for the public is good for the utility and vice versa; that when one prospers or suffers the other does likewise.

COMMISSION MADE POPULAR

He laid stress on six points which stated the whole utility question in a nutshell. These have been taken up and quoted widely in the industry as the things that must be brought home to the public before relief from the present dilemma can be gained. Some of the principal points made by Mr Haynes why rates should not yet be reduced were that utility rates have not paralleled other prices during the period of inflation, that utilities, having earned less than a fair return on their fair valuation, should be permitted to recoup their losses, and that there is an immense amount of deferred maintenance to be taken care of.

Mr. Haynes contended that it is the duty of a commission to see that the utilities are not only solvent but that y are maintained in a healthy condi- n. As a member of the commission has done much to promote this view his influence has deservedly had ults in placing the commission in its rect relation with the public and the ties.

etires After Thirty-six Years with United Railways

'atrick Callaghan, foreman of the rth Division of the United Railway, Louis, Mo., has resigned after com- ing thirty-six years of service. friends of the retiring foreman, bering every man connected with South Broadway station, arranged urprise party to honor Mr. Callag- . An elegant morris chair, pur- sed by voluntary contributions from his fellow workers, was presented Ir. Callaghan and a fund was unani- sly pledged to buy his smoking cco for life.

mong those who spoke, paying trib- to the veteran foreman, was H. O. ler, superintendent of transporta- , who warmly congratulated Mr. aghan and mentioned his splendid rd of service. He told the train- that he hardly knew the company a Fourth Division, because both dents and complaints were few, and was very glad to compliment the nmen on their efficient work.

. F. Trotter, division superintend- although it had not been his good une to have known Mr. Callaghan the last quarter of a century as some, said that during the year that ad known him their relations had most agreeable. He added that it ld be the trainmen who would suffer greatest loss, because they were the who had received both his advice counsel, which has been so freely kindly given.

Manager Butler Discusses Atlanta's Railways

tlanta is plainly an up-to-date, ndid city with a traction system of the very best." This is the opin- of F. L. Butler, new manager of Georgia Railway & Power Com- , Atlanta, Ga., and at one time ager of the Winnipeg Electric Rail- , Canada. The new manager, as- ing office on Feb. 7 last, delivered iplomatic message in which he red Americans of Canada's friend- for the United States. He com- d Winnipeg to Atlanta, saying that are alike in size and in the details affic. Mr. Butler made the follow- comments:

> e rapid transit service of a city is one e most important industries it has. A transportation system is the backbone city's life. The visitor to a city sur- its street car service as the first means dging the city. The city government d regard the transit condition as one e most important matters of welfare e city and its people.
>
> vestors studying a new town with the of locating there have to consider the t car service as the subject of first rtance in deciding them. The question ore important to such an investor than uestion of real estate values. In fact estate values are largely based on the ay service the real estate possesses.

Mr. Harris Elected

Superintendent of San Francisco-Oakland Terminal Railways Becomes President of Pacific Railway Club

At a meeting in Oakland, Cal., on March 10 the Pacific Railway Club elected as its president for the ensuing year G. H. Harris, general superintendent of the San Francisco-Oakland Terminal Railways, Oakland, Cal. F. S. Foote, professor of railroad engineering, University of California, was elected first vice-president. Mr. Harris, in becoming president of the Pacific Railway Club, succeeds Dennistoun Wood.

An experience of over thirty years as a railway operator on various roads makes Mr. Harris well qualified to fulfill the duties as president of the club. Mr. Harris is a graduate in civil engineering and has been connected with the engineering departments of the Chattanooga, Rome & Columbia Railway; Briarfield, Blockton & Birmingham Railway; Southern Railway; Alabama, Georgia & Florida Railroad, and the Georgia, Midland & Gulf Railroad. He left the employ of the last company in 1890 to superintend the conversion of the Birmingham system from mule power to electricity. At the completion of the reconstruction he became master mechanic, in which capacity he served until about 1902, when the office of superintendent of traffic was created. Mr. Harris was chosen to fill that position and continued as superintendent of traffic until 1904, when he was appointed manager of the railway department of the company. His title was subsequently changed to superintendent of the railway department.

G. H. HARRIS

In 1914 Mr. Harris became general superintendent of the San Francisco-Oakland Terminal Railways, in which position he had general charge of the transportation and maintenance departments. Since that time his responsibilities have been increased by the taking over of direct personal charge of several departments. Upon the resignation of A. W. MacPherson, chief engineer, Mr. Harris assumed active charge of all maintenance-of-way and structures work. Other branches of the work directly under his charge are the electrical and mechanical departments. In recent years he has devoted more and more of his time to maintenance matters and is now the active head of all maintenance and operation for the company.

New Publications

Connecting Induction Motors.

By A. M. Dudly, engineering department, Westinghouse Electric & Manufacturing Company. 252 pages, cloth, 6 x 9 in., illustrated. McGraw-Hill Book Company, New York. N. Y.

In view of the widespread use of the induction motor, this presentation, from a practical standpoint, of the details of winding and connecting motors of this type is of timely interest and value both to students and to operating engineers.

Powdered Coal as a Fuel

By C. F. Herington, Second Edition. 388 pages, 124 illustrations. D. Van Nostrand Company, New York.

Coincident with the rise in price of coal, more attention and study have been directed toward the efficient burning of cheap fuels. By powdering, coals high in ash content can effectively be used. The author of this book has made extended studies in his subject in foreign countries where, perhaps, the methods and economies possible have been thoroughly investigated. He points out that the efficiency, flexibility and elimination of banking losses by the use of powdered coal under boilers indicate it to be a most promising fuel. Among others, he cites the power plant of the Milwaukee Electric Railway & Light Company as one successfully operated on pulverized fuel.

Financial Engineering

A text for consulting, managing and designing engineers and for students. By O. B. Goldman, consulting engineer and professor of heat engineering Oregon State Agricultural College. 271 pages, illustrated. John Wiley & Sons, Inc., New York City.

The complaint is often made, sometimes justly, that the engineer is more interested in his engineering than in the financial results of what he engineers. This criticism is less deserved now than formerly; in fact, a considerable part of engineering today consists in appraisals and the like, bringing the engineer in close contact with one phase of finance. The engineer will appreciate a book like this one by Professor Goldman, who has applied engineering principles in finance. He has carried engineering problems farther than usual, to the point of determining, not only the question "What will it do?" but also "Will it pay to do it?" He uses a term "restance" as a complete measure of what a service costs in the long run, defining this as "the equivalent cost of a permanent service." This quantity is used throughout. While somewhat mathematical in spots the book is not complicated. It is illustrated with numerous examples and graphs.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Safety Car Price Reduced

The National Safety Car & Equipment Company, St. Louis, Mo., has announced a reduction in the price of the standard safety car to $6,500 for a double-end car purchased on a cash basis. This new lower price has been made possible by the reduction in the cost of various equipment. The announcement also includes a plan for the purchase of new cars on the equipment trust basis or on a leasing basis.

Fiber Conduit Buying Not Very Strong

Stocks at Mills Are Capable of Handling Immediate Shipments and Production Is Continuing

Unlike usual buying conditions in the fiber-conduit field at this time of year, the present market is quite dull. Manufacturers at the same time have built up large stocks of this material to handle business which is expected to come in later in the spring and summer with request for quick delivery. No difficulty can be experienced now in shipping common sizes from stock. To continue this condition the mills as a whole are working virtually full time.

To be sure, some orders have been taken for good amounts for spring delivery, and the early break-up of winter is providing an added incentive to purchase at this time. Many power stations have plans ready for heavy extensions, but these are being held in abeyance till a later time. Certain parts of the Southwest, West and Central States have been in the market, with some amounts coming from the East.

In line with prices of other commodities, at least one mill has reduced its price in an amount ranging from 15 to 18 per cent. Up to date no other instances of a price drop have been found.

Rail Mills Have Fair Capacity Booked

Steam Roads Have Taken Good Capacity for First Half Year—Foreign Steel Prices Lowered

Rail orders from steam roads are in pretty fair volume in the rolling mills. This is particularly so for first half year mill capacity, although there is still some capacity for that period which can be booked. Girder and high T rails likewise are reported to have a fair schedule ahead. Much of the rail buying to date was done in December and has been for shipment in specific months, some running into the second half. There is little for quick delivery, and generally speaking it would be with difficulty that even as low as thirty-day shipments could be made.

The Treasury Department has some money available for equipment needs but this will be relatively small compared with the roads' needs. Still there are some large orders reported about ready to be placed for spikes, quotations on which is given as 3.65 cents.

In the foreign market the Danish railways are reported in the market for about 6,000 tons of rails, 11,000 fish plates and 150,000 sole plates. A contract is said to have been awarded to Krupps of Germany for 10,000 laminated steel car wheels for the Argentine State Railway. Chilean State railways are looking for tenders on steel rails and accessories in an amount estimated at $1,500,000. At the same time English, Scotch, Belgian and German steel mills have made recent cuts in their steel prices in an endeavor to get export trade.

Copper Sells at 12 Cents

Still Little of the Metal Is Changing Hands—Government Sells Scrap Brass

The copper market is down to a level lower than it has been at any time since 1914. In the outside market, sales in relatively small amounts are being made at 12 cents a pound, refinery. The sales at this figure are necessarily small because it is felt any considerable attempt to purchase in large lots would react for a rise in price. Buying interest is indeed light. This is to be expected under the low rate of production now carried on by electrical manufacturers. Only a few of the producers are willing to come close to these bottom figures, with a price of 12.25 cents, delivered, for spot. Most producers, though, are still holding for 12.75 to 13 cents, delivered, for the first half year.

Announcement has been made by the Government that it has sold 30,000,000 pounds of its 47,000,000 pounds of brass cartridge cases which have been offered several times. The Chase Companies, Inc., Waterbury, the Scovill Manufacturing Company, Waterbury, and the Bridgeport Brass Company, Bridgeport, Conn., each took 10,000,000 pounds. The price is a percentage of the market prices to be adjusted monthly. This probably will have a retarding effect on the scrap copper and brass market, which is now on a very quiet level.

Line Hardware Stocks in Good Supply

Utilities and Railways Not Covering for Spring Needs, Although Buying Is Expected to Pick Up in April

A survey of the pole-line hardware market reveals the fact that utilities are not anticipating their spring needs. Some business has been placed, but the market on the whole is quiet. Restricted buying power with both power companies and electric railways is largely blamed by manufacturers for the light demand. It is expected, however, that by the end of next month sales should have picked up considerably.

Producers are continuing production of hardware, though in some cases reserve supplies are not large. One company, in fact, reports being still as long as three to four weeks behind in its line hardware department. In general, however, stocks are more than ample for present needs, and on reasonable size orders consumers may count on stock to one-week shipments.

Prices have not changed since general reductions of from 5 to 7½ per cent were put into effect by leading manufacturers about the middle of February. This is the second general cut that has occurred, as decreases of from 5 to 15 per cent were made during December and early January. In some quarters the view is heard that present quotations have about reached bottom. Prices quoted by a representative producer f.o.b. Chicago are as follows: Carriage bolts, ⅝ in. x 4½ in., $2.31 per 100; crossarm braces, 1¾ in. x ¼ in. x 28 in., $14.42 per 100; lag screws, ½ in. x 4 in., $4.02 per 100; machine bolts, ⅝ in. x 12 in., $10.65 per 100. New York prices are about 20 per cent higher than the above to allow for freight and warehouse charges.

Funding of Car Company Planned

Plans were submitted to the bondholders and stockholders of the Barney & Smith Car Company, Dayton, Ohio, by the directors on March 9 which call for funding the notes and current liabilities and financing the working capital requirements of the company through an issue of $2,000,000 second mortgage 7 per cent bonds. Under the plan of the directors, which is approved by the stockholders' committee, all indebtedness would be funded, the receivership lifted and working capital provided.

At this time, it was pointed out, when conditions indicate a profitable resumption of business the company finds it-elf having a valuable plant, but being without working capital. Since the plant cannot be sold under foreclosure at anything near its value, the only alternative is for the bondholders and stockholders to provide working capital, so that it can be put to its only proper use. The property is subject to foreclosure on and after April 1, 1921, and to prevent this action the plan must be agreed to promptly.

A meeting of the directors will be held in Cincinnati on March 24, at which time the plans will be accepted or rejected. The directors of the company are C. H. Rembold, manager of the Cincinnati *Times-Star;* Attorney Lawrence Maxwell, Cincinnati; H. W. Lothmann, T. C. Simpson, Claude V. Black, E. E. Werk and E. F. Kimmel.

Advantageous Time to Cover Coal Needs

Favorable Prices, Good Deliveries and Possibility of Future Car Shortage —Calder Coal Bill Dies

Inactivity continues to feature the coal market. Consumers for the most part are apparently confident of filling their future coal needs easily enough, hence buying on the part of railroads, public utilities, etc., is for current needs only. On the other hand there is a belief among a considerable part of the coal industry that there is another period of car shortage and high prices on the way. Credence is lent to this belief by the increasing number of inquiries for contract quotations by consumers who are figuring on their year's needs.

According to the March 17 issue of *Coal Age* prices of bituminous coal, having followed an irregular downward curve ever since the middle of last August, are now about as low as can be expected, both for spot and contract delivery. Therefore the present would seem to be an advantageous time for utilities to protect themselves by not only contracting ahead for a good grade of coal at a reasonable price, but also by putting the greater portion of this coal supply in stock within the next few months.

Production, which has steadily declined from the middle of last December, is considered to have about reached bottom now. Total output up to March 5 for the present coal year ending April 1 is placed at 497,818,000 tons by the United States Geological Survey. This compares with 447,900,000 tons a year ago, when the interruption of production by the great strike drew so heavily on reserve stocks. It is more significant that the present yearly output is over 13,000,000 tons behind 1917-18, a year when requirements were large and output about equaled consumption.

In connection with the present coal situation it might be well to note that the Calder coal bill, which originally aimed at federal regulation of the coal industry, died a natural death through the ending of the Sixty-sixth Congress on March 4. The bill as reported to the Senate was so amended that it bore little resemblance to the original draft, the provisions providing for publicity of information concerning the coal trade being virtually the only ones to remain.

Rolling Stock

Kentucky Utilities Company, Somerset, Ky., has purchased two standard safety cars from the National Safety Car & Equipment Company, St. Louis, Mo.

Boston (Mass.) Elevated Railway Company announces that it has decided to call for bids on ten one-man cars to replace rolling stock that was lost in the Amory Street carhouse fire on March 4.

The Detroit (Mich.) Municipal Railway has called for bids on 100 Peter Witt single-end, double-truck, center-exit cars with a seating capacity of fifty-six passengers. Bids will be opened on March 25.

Franchises

Monongahela Valley Traction Company, Fairmont, W. Va.—A meeting was recently held in Marietta, Ohio, in connection with a new franchise grant to the Monongahela Valley Traction Company which must be passed upon before April 7.

Indiana Service Corporation, Fort Wayne, Ind.—The Indiana Service Corporation is planning to double-track Pontiac Street, from Calhoun Street to Anthony Boulevard, a distance of about ten or twelve blocks. The franchise for the double tracks on this street has been approved by the Board of Public Works, and will be sent to the council for ratification. A large number of Pontiac Street residents have announced their intention of protesting the proposed double-track improvement.

Portland, Ore.—Multnomah County Commissioners have granted a conditional twenty-five-year franchise to J. B. Schaefer and other residents of Linnton for the construction and maintenance of a railway between Nicolai Street and Linnton, along the St. Helens Road. Under the county franchise, which becomes effective on April 6, a 10-cent fare may be charged. The permission is not complete without the consent of the city commissioners to operate such a line within the city limits. The franchise provides for the payment of 5 per cent of the net income from the operation of the railway to the county. A track running to Oilton, about three miles from Linnton, all electrified, is now owned by Hill interests, on which cars were formerly operated. It is stated that this line can be secured, and that about $60,000 would be required to complete the proposed line from Nicolai Street to Linnton.

Power Houses, Shops and Buildings

Northern Ohio Traction & Light Company, Akron, Ohio.—The Northern Ohio Traction & Light Company has built a new substation in Massillon in which are installed two 500-kw. rotary converters.

The Swiss Federal Railways, it is reported from Berne, will require the expenditure of 300,000,000 francs in its electrification. The report continues that the Federal Council is negotiating with American bankers for a respective loan.

Columbus, Delaware & Marion Electric Company, Columbus, Ohio.—In an effort to relieve the acute power shortage in the vicinity of Marion, Ohio, the Columbus, Delaware & Marion Electric Company is constructing a modern electric generating plant at Scioto. Although 10,000 hp. is being installed provision has been made for doubling the capacity without building additional structures. Power needs of industrial and manufacturing plants will be taken care of in this plant.

Kansas City (Mo.) Railways.—The Kansas City Railways, which has been supplying some current in the downtown area for the Kansas City Power & Light Company, will relinquish this service in a few weeks. The light company has been using a decreasing amount of current, as it has put into service more and more of its own new equipment, and it will soon be ready to handle all its own current supply, necessary changes in distribution elements being about completed. When the service to the light company is discontinued changes are to be made in the railway's power plant, both in equipment and in operation. The company will continue to sell current to certain interurbans.

Track and Roadway

Connecticut Company, New Haven, Conn.—Paving improvements in the city of New Haven are awaiting track repairs by the Connecticut Company. Director Lane has stated that the city will go ahead with the work as soon as new ties and rails replace the worn-out equipment.

Miami Beach Electric Company, Miami Beach, Fla.—The Miami Beach Electric Company expects in the near future to build three new turnouts.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.—Improvements contemplating an expenditure of approximately $600,000 will be made at the Terre Haute, Ind., power plant of the Terre Haute, Indianapolis & Eastern Traction Company. The Indiana Public Service Commission recently granted to the local utilities company an increase in lighting and power rates in Terre Haute and along with the increase an order was entered directing the company to make certain changes intended to improve the service. The work to be done includes an addition to the power plant and the installation of additional equipment. Increase in power production, extension of service lines and placing of wires underground are among the items to be included in the improvement plan as now contemplated by the company.

Boston, Mass.—The Boston Transit Department has submitted to the Legislature a plan for the extension of the Boylston Street subway to Postoffice Square. The new subway as planned will do two things: It will give Boston a central, easily accessible gateway which will handle commuters, and will avoid congestion at the Park Street subway station.

Michigan Railroad, Jackson, Mich.—A resolution has been adopted by the City Commission of Battle Creek that the Michigan Railroad should extend its Garfield line, which now reaches Central Street, along such stresses as is necessary to connect the line with the Maple Street line terminus. It is said that this part of the city is without suitable car accommodations. The commission will soon consider the proposed extension.

Trade Notes

The Mar-Sla Manufacturing Company, Youngstown, Ohio, recently organized and with a plant at Hubbard, Ohio, will deal in chemically treated switchboards.

The Dayton Mechanical Tie Company, Dayton, Ohio, has appointed J. J. Costello, 201 Devonshire Street, Boston, Mass., its representative in the New England states.

The Packard Electric Company, Warren, Ohio, manufacturer of transformers, has moved into its new quarters in the Printers' Crafts Building, 461 Eighth Avenue at Thirty-fourth Street, New York City. J. E. Erickson, manager for the New York district, is in charge.

The Jeffrey Manufacturing Company, Columbus, Ohio, manufacturer of electric locomotives, elevating, conveying and crushing machinery, announces the removal of its Denver (Col.) office from the First National Bank Building to 421 United States National Bank Building.

Stuckeman Brothers, 18 Ruth Street, Pittsburgh, Pa., manufacturer of small motor-driven air compressors and other specialties, has recently been incorporated with a capital stock of $50,000, in order to facilitate expansion along other lines. W. F. Stuckeman is president.

Mitchell-Rand Manufacturing Company, 18 Vesey Street, New York, is distributing in the New York territory ebony asbestos wood for switches, panels and bases manufactured by Johns-Manville, Inc. A good assortment of stock will be carried in the company's warehouse to insure quick deliveries.

The Conveyors' Corporation of America, Chicago, Ill., announces that the Power Equipment Company, 131 State Street, Boston, has been appointed New England representative for its American trolley carrier and its monorail equipment for handling coal, ashes, etc., Colwell & McMullin, 79 Milk Street, Boston, are New England representative for the company's American steam ash conveyor.

W. W. Joy has joined the forces of the Advance Machinery and Supply Company, Denver, Col., as vice-president and sales manager. Mr. Joy, who is a graduate of Ames College, Iowa, and a member of the A. S. M. E., for the past three years has been special sales promotion representative for the Fisher-Governor Company, Marshalltown, Iowa. The Advance Machinery and Supply Company is sales representative for twenty-three manufacturers of steam and electrical specialties.

The Equitable Equipment Company has just been formed for the purpose of handling second-hand locomotives, cars, railway equipment, rails and rail accessories, machinery, etc. The new company, with offices at 411 Whitney-Central Building, New Orleans, La., is taking over the equipment, rail and machinery business of A. Marx & Sons, Southern Scrap Material Company and the Ship Supply Company. The firm will be under the direct management of O. D. Cleveland, who has been manager of the New Orleans branch of the General Equipment Company.

George Oliver Smith has recently joined the American Atmos Corporation, Pittsburgh, Pa., manufacturer of oxygen resuscitation and breathing apparatus, as vice-president and chief engineer. Mr. Smith comes to his new position from Henry L. Dougherty & Company as Supervisor of Safety. He organized the accident prevention department of that organization in 1913, and has since then had executive charge of all the accident prevention, as well as special sanitation and welfare activities of the company. Mr. Smith's first position was with J. J. White & Company, Inc., with whom he was associated for five years as junior engineer.

Osborne E. Quinton, treasurer of Holden & White, Inc., has resigned to become vice-president of the Central Hyde Park Bank of Chicago. Mr. Quinton's first connection with the electric railway field was as general representative of the Peter Smith Heater Company, of which concern he later became vice-president and general manager. In 1918 he severed this connection and with Walter E. Hinman took over the sale of the Jewel hot-blast stoves for electric railway use, produced by the Detroit Stove Works, together with some other specialties. In the spring of 1919 the firm of Hinman & Quinton was consolidated with Holden & White, Inc., and Mr. Quinton was elected secretary and treasurer of the latter company. When this company was sold to the National Railway Appliance Company in the fall of 1919 he was elected treasurer of Holden
& White, which continued in operati
in conjunction with the holding co
pany. He held this office actively ur
Holden & White was recently absorb
by the Hegeman Castle Corporati
Mr. Quinton retains approximately
one-fifth interest in the National Ra
way Appliance Company, of which
is a director. He will also continue
vice-president of the Burry Railw
Supply Company, manufacturer a
distributor of Hartman center be
ings, Perry side bearings and Peerl
side bearings.

New Advertising Literature

Feed Water Filter. — The Grisco
Russell Company, 90 West Street, N
York City, has issued bulletin No.
describing the G-R Multiscreen Filt

Electric Buffer.—The U. S. Electri
Manufacturing Company, Los Angel
has recently developed a new hea
duty Johnson electric buffer.

Lubrication.—Lubrication of Ste
Turbines, Part I, is the substance
the February issue of *Lubricati*
published by The Texas Company, N
York City.

Bond and Signal Wire.—Copper C
Steel Company, Rankin, Pa., has issu
two folders covering "Copperweld" w
for signal service and "Copperwel
bond wires.

Tools.—The Goodell-Pratt Compa
Greenfield, Mass., is distributing
"No. 14 Tool Book," in which it
scribes and illustrates over 2,000 si
and kinds of tools.

Power Plants.—E. W. Clark & Co
pany Management Corporation, Colu
bus, Ohio, has issued Booklet A, deali
with unit power plants and offering
plan for preliminary engineering
commendations.

**Electric Equipment for Movab
Bridges.** — "Electrical Equipments
Movable Highway and Railway Bridge
is the title of bulletin No. 48034 issu
by General Electric Company.

Battery-Charging Equipment. — T
Automatic Electrical Devices Compa
120 West Third Street, Cincinnati, h
issued bulletin 620, illustrating its va
ous types of fixed resistance chargi
panels for industrial trucks and lo
motive service. Bulletin 621 covers
"Unipanels," sectional battery-chargi
equipment for charging industri
trucks, storage-battery locomotiv
and electric commercial vehicles.

Storage Batteries.—The Gould Sto
age Battery Company, 30 East Fort
second Street, New York City, h
issued bulletin L-2, describing typ
L-149-A and L-149-B of Gould stora
batteries for mining and industri
locomotives. Catalog V-7 covers
electric vehicle types of storage ba
teries with "Dreadnaught" plates. T
company is also distributing two boo
lets giving instructions on the care a
operation of the Gould locomotive ba
teries and Gould batteries in mine loc
motives.

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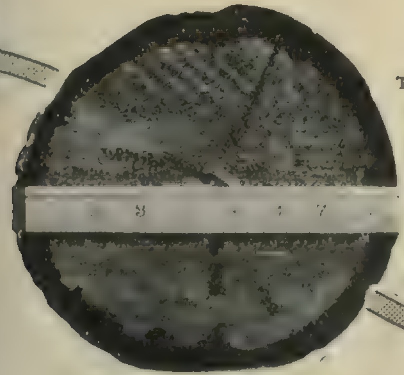

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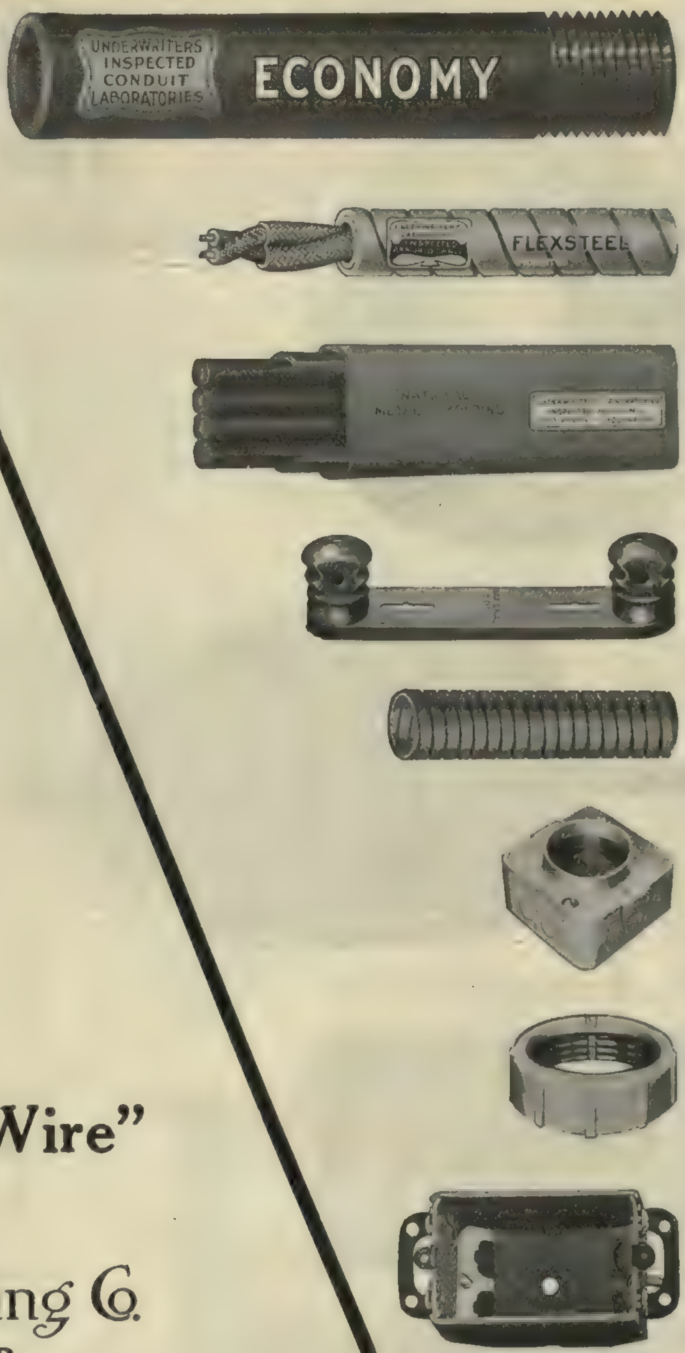

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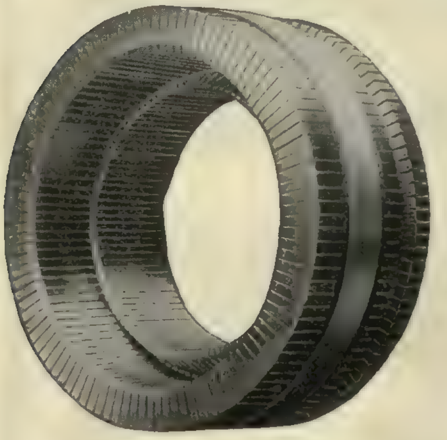

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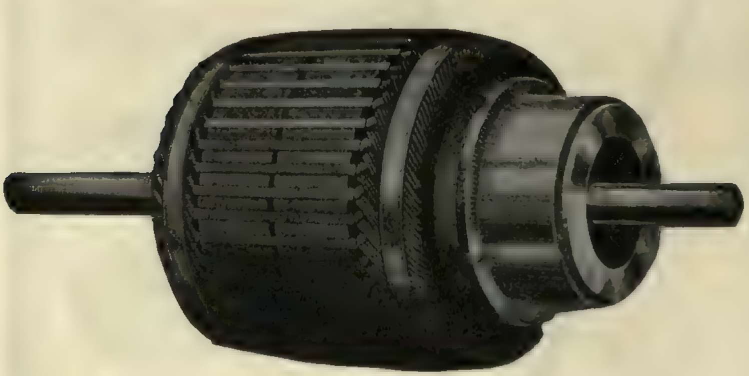
that we can put into them. Before a Commutator leaves our factory it is carefully inspected to see that each detail is correct, then it is TESTED. Neither you nor we can afford to take any chances that a Cameron Commutator will not prove satisfactory—to YOU—in every respect.



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are pressed together by hydraulic pressure. This insures absolute *tightness*, eliminating loose bars. Assembled commutators are bored true to gauge, filling perfectly the shell to which they may belong.

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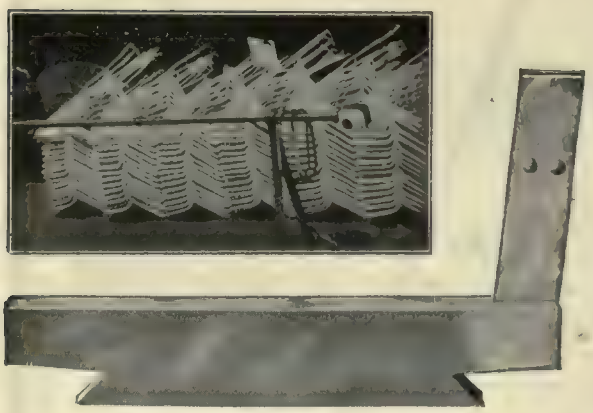

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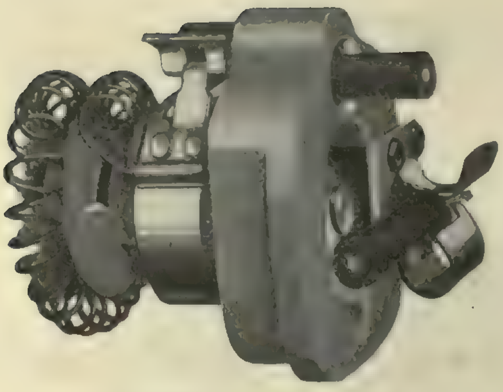
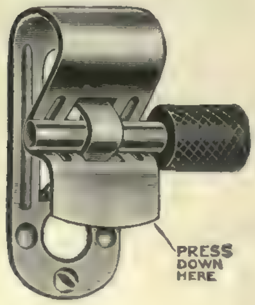


Assembled on Heater Coil



for testing or Replacing New Heaters or heater coils.

By the use of Fahnestock terminal spring clips, connecting leads can be quickly withdrawn and inserted whenever it is necessary to remove a coil.

Your Maintenance man likes Fahnestock clips better than any other kind because they are so easily and quickly installed.

Only the highest quality material enters into the manufacture of Fahnestock clips. Correct design, careful manufacture, and careful inspection guarantees the reliability of each and every Fahnestock clip that leaves the factory.

Of the hundreds of thousands in use over 90,000 are on Brooklyn Rapid Transit cars.

Over 40,000 are on Public Service Railway of N. J. cars.

Over 15,000 are on Connecticut Railway Co.'s cars.

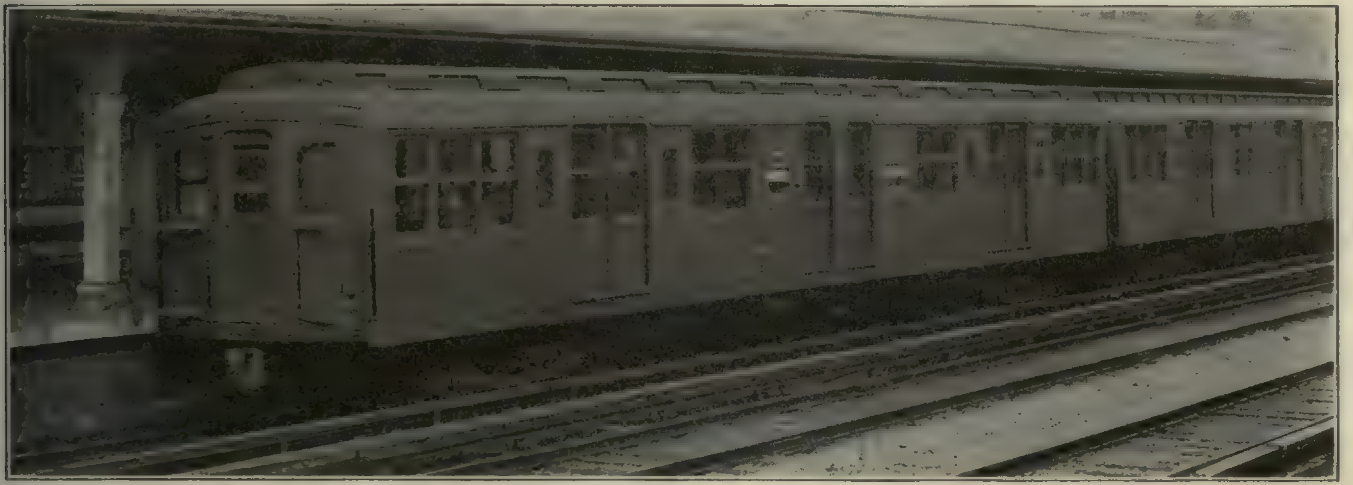
Over 10,000 are on New York Central Multiple Unit cars.

Also on many other hundreds of cars, including New York, Westchester & Boston, Springfield St. Ry. cars, Springfield, Mass.; Worcester St. Ry. Co.'s cars, Worcester, Mass.

FAHNESTOCK ELECTRIC CO.

Long Island City, N. Y.

Gold Heaters by the Thousands

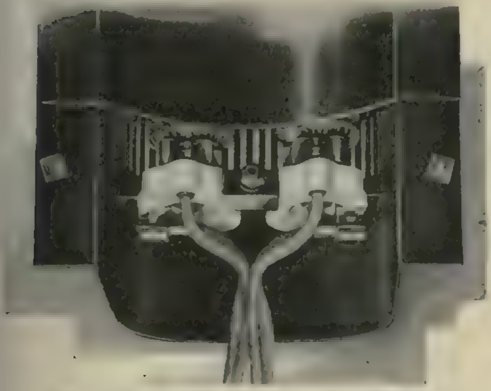


9000 Gold Heaters

in Service on One Railway System

No. 381-E Gold Panel Heater, which was standardized for the first 100 cars of New York Municipal Railway, has been maintained for the 700 cars bought for this service.

In conjunction with the engineers of the New York Municipal Railway Corporation this panel heater was developed and without a doubt is the best electric heater ever constructed for Electric Railway Cars because of its many advantages and low cost of maintenance.



End view, 405 E Cross seat heater
(End plate and deflector removed)

Gold Heaters for Safety Cars

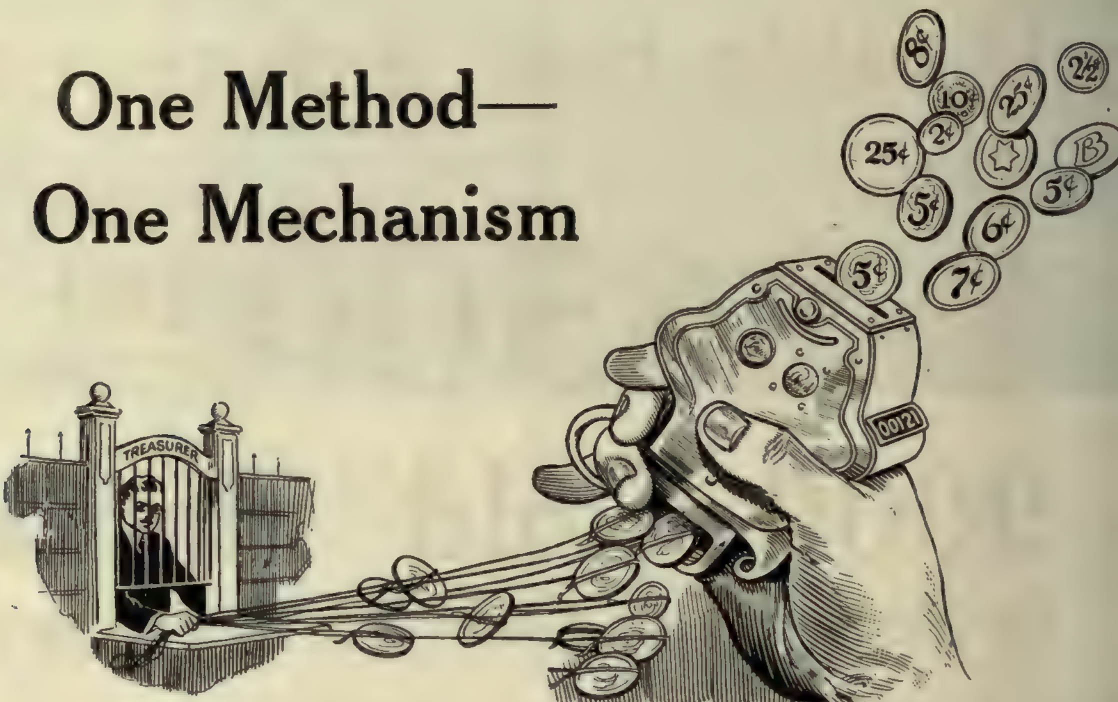
The No. 405-E Gold Cross Seat Heater has been installed in the two largest individual safety car orders placed, namely 200 for the Brooklyn Rapid Transit manufactured by the J. G. Brill Company and 200 for Public Service R.R. Co. manufactured by Osgood Bradley Car Co.

The Gold Car Heating & Lighting Company is proud of the selection of No. 405-E Cross Seat Heater for these Safety Cars, because they were specified regardless of the fact that they were able to supply a cheaper heater for this service. Experience, however, has proven that the 405-E Cross Seat Heater is the best investment. It has been shown that on the Brooklyn Rapid Transit the travelling public give preference to cars equipped with a suitable cross seat heater rather than other types.

Gold Car Heating & Lighting Co.
Bush Terminal, 220 36th Street, Brooklyn, N. Y.

A String On Every Fare Value

One Method—
One Mechanism



Rooke Fare Registers

are made in several New Types

No matter what the fare may be—i.e., 5c., 10c., 25c. or paid in the form of a metal ticket—there is a Rooke register with a capacity adequate to receive any combination of or all of these different coins and classify the values accurately, as—

1—THE ROOKE FOR NICKELS and DIMES: The insertion of a nickel instantly moves up one point on the totalizing counter; the dime charges the conductor with two such points. The conductor's turn-in is figured at the rate of five-cents-a-point, for such numerical point accumulated on the *one* totalizing counter.

2—THE ROOKE FOR NICKELS, DIMES and QUARTERS: The insertion of nickels and dimes charges the conductor exactly as with the two-coin type just described. The quarter operates another counter and charges the conductor on the 25c.-a-point-basis. This is a two-counter machine.

3—THE ROOKE FOR NICKELS, DIMES and METAL TICKETS: This is a two-counter register. Nickels and dimes are registered on one counter and the metal ticket on an entirely separate counter. The metal coin can represent either a 2½c.—6c.—7c.—7½c.—8c.—9c. or any other arbitrary fare rate.

For *all* types of cars or for use in conjunction with boxes to care for *outer-zone collections, street collections, open-car collections* and all other contingencies where the collection system, to be efficient, should be as *flexible* and *mobile* as the conductor's work requires him to be.

A brand new ROOKE adaptation for one-man cars will soon be announced. Write us about it.

ROOKE AUTOMATIC REGISTER COMPANY

Providence, R. I.

We have reduced

Double End Safety Cars

to

$6500.00

on a CASH basis

This revision is made possible by a reduction in cost, and we are indeed pleased to make this announcement.

If it is more convenient for you to buy on terms, we offer you *Safety Cars* on the

Car Trust Plan

part Cash, balance covering a period of from three to five years; or, we will

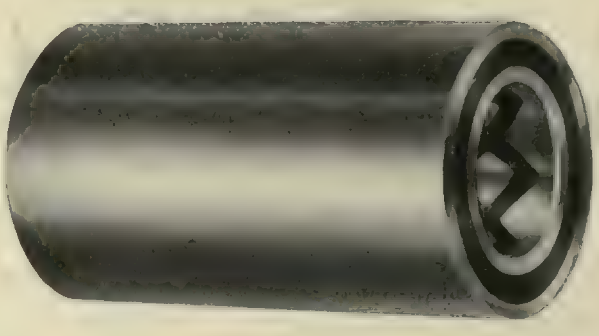
Lease

cars to you at so much per day, for a certain period, at the expiration of which you can, at your option, either buy the cars (at a reasonable price) or renew your lease.

Which of these plans interests you?

National Safety Car and Equipment Co.
National Building
St. Louis

Manufacturing Trolley Wheels?



"Bound Brook" Oil-less Bushings Sell Your Wheels More Easily

Two-thirds of the electric railway systems of America have their trolley wheels lined with "Bound Brook" Oil-less Bearings. You can use the same argument in selling your wheels as we use in selling—and keeping sold—these customers.

A "Bound Brook" bushing in a wheel means an all-round saving for the user. The cost of oil is entirely eliminated; there is no attention or care required; the necessity for replacing bushings is done away with; the bearing outwears the wheel. A great wheel sales talk.

Don't specify a graphite lined bushing. Graphite is such a general name it is deceiving. Insist on "Bound Brook"—in the green package.

Bound Brook Oil-less Bearing Co.

Specialists in the manufacture of Oil-less Bushings
for more than a third of a century.

Bound Brook, New Jersey
Detroit Office: 1723 Ford Bldg.

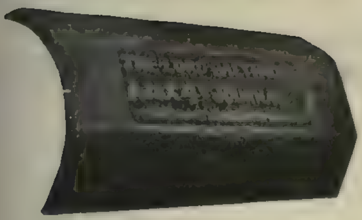
TRADE MARK

Get Better Bearing Metal and Castings and get them at less cost

How can you increase the quality and decrease the price at the same time?

The answer is: Order from a manufacturer who makes a specialty of bearings. If you order from the car builder it means special work on a small order from him and you are almost sure to pay big jobbers profits on parts so ordered. If you make the patterns yourself and have them cast in some local foundry, inferior quality is apt to result.

The Ajax Metal Company manufactures thousands of tons of bearings every year. The small order receives the same careful attention as the large order. Having everything at hand for turning out bearings, the small order and the large order alike are produced at most reasonable cost.



Ajax Car Brasses have been the leaders for forty years.

Ajax Check Plates last longer because they're made better.

Ajax Car Brasses have been leaders in their field for 40 years. Made with the same precision and accuracy as a car wheel.

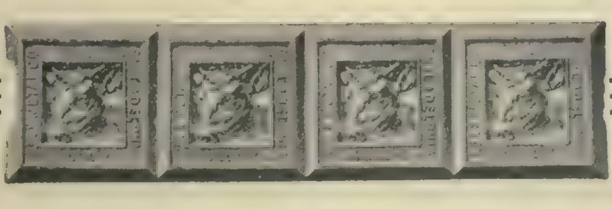
Ajax Check Plates—made of our Perfecto Bronze, which will bend before it will break—outlast all other check plates.

Ajax Bull Bearing Alloy—the most economical and dependable lining for brasses and axle bearings—lasts longer and runs cooler; costs less.

Specify Ajax products for new equipment and repairs

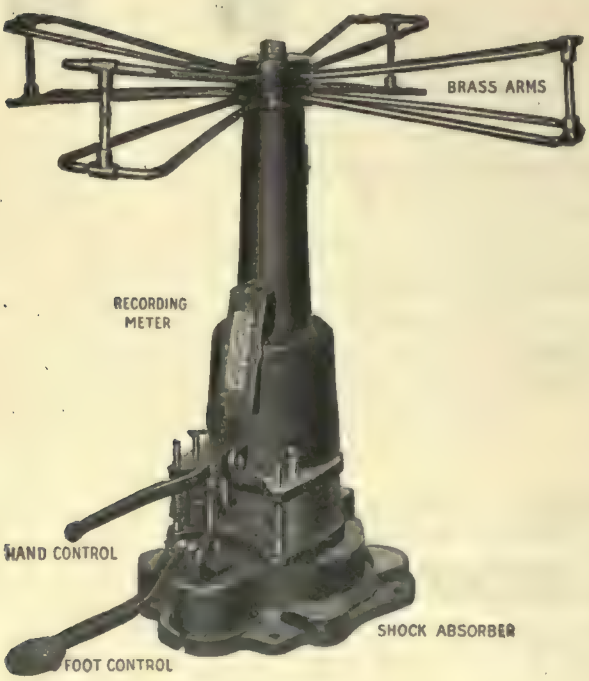
THE AJAX METAL COMPANY

Main Office and Works: Philadelphia, Pa. **Established 1880** **Southern Plant: Birmingham, Ala.**



PEREY TURNSTILES

for Mass Transportation



Mass Transportation is the outstanding need o
successful electric railway operation today.

Where large numbers of car riders are handle
regularly, Perey Turnstiles are indispensable fo
efficiency because they enable the railway to handl
greater numbers in the least amount of time an
are in no way responsible for car delays in termi
nals while loading.

And they are indispensable for handling of larg
crowds *economically* because 100% fare collectio
is inevitable. Passengers can't pass if they don
pay.

These are some of the outstanding reasons why Th
Fairmount Park Transit Co., Philadelphia, Pa.
has installed Perey Turnstiles at their Fairmoun
Park Station.

Tell us your conditions and we shall gladly fur
nish an estimate covering your needs.

Perey Manufacturing Company, Inc.
30 Church Street, New York, N. Y.

DURADUCT
The Quality Conduit

DURACORD
The Quality Cord

One has made good—the other *will* make good in electric railway service

Remember this car? It's the very first Birney Safety, seating 29, and was built some five years ago.

It was wired in Duraduct because Mr. Birney wanted lightness.

Time has justified his choice, for Duraduct, the original, non-metallic conduit with the black dotted line on the interior, has since become the standard on thousands of cars of every size in every climate and for every circuit.

Not only because it was light, but because it also made good our claims of durability, easy fishing and cleating, resistance to wear torsion, fire and water.

Now order its car mate

DURACORD

The portable cord with better-than-Underwriter's insulation and the cover woven like fire-hose.

Available in every size up to No. 0000, you can use it in the smaller sizes wherever conduit is inconvenient. And in the larger sizes—as for train connections, you will get better and greater safety than from steel-armored cable, because Duracord will stand twisting and kinking without breaking open.

For Electric Track Welders, magnetic cranes, portable tools, pit extension lights and all other places where portable cord is used there is a size of DURACORD to meet requirements. You will find it economical in the long run to use it.

Let us send you samples of Duracord and ordinary portables that you may satisfy yourself that Duracord is a worthy companion to Duraduct.

Tubular Woven Fabric Co., Pawtucket, R. I.

Shanklin Transfe

Speed U

High Speed Transfer Machine Issues Transfers with Machine Gun Rapidity

Daily Report of Transfers Issued at Eastern States Fair, September, 1920

September 20, 1920....	4,363
September 21, 1920....	5,022
September 22, 1920....	10,862
September 23, 1920....	10,551
September 24, 1920....	19,719
September 25, 1920....	16,819

Our machines issued these transfers for the week, showing that these machines are built for hard usage.

Crowds at loading stations are issu
transfers so quickly that they litera
melt away before this high speed trans
delivery.

In Springfield, Mass.

schedules actually have been speeded
by speeding up the loading of passeng
and reducing the length of time that c
are required to stop.

During the Eastern States Expositi
these transfer-issuing machines w
thoroughly tested by the Springfi
Street Railway—as the figures to the
plainly indicate—but owing to the l
of patrons, could not be tested to th
maximum capacity although they
actually issue more than 10,000 transf
a day.

Transfer Machines have been in ope
tion since October 10, 1920, in Spri
field, Mass., on both the large prep
ment cars of the Walnut Street Line
on the safeties of the Maple Street Li
issuing all transfers and giving unequa
service.

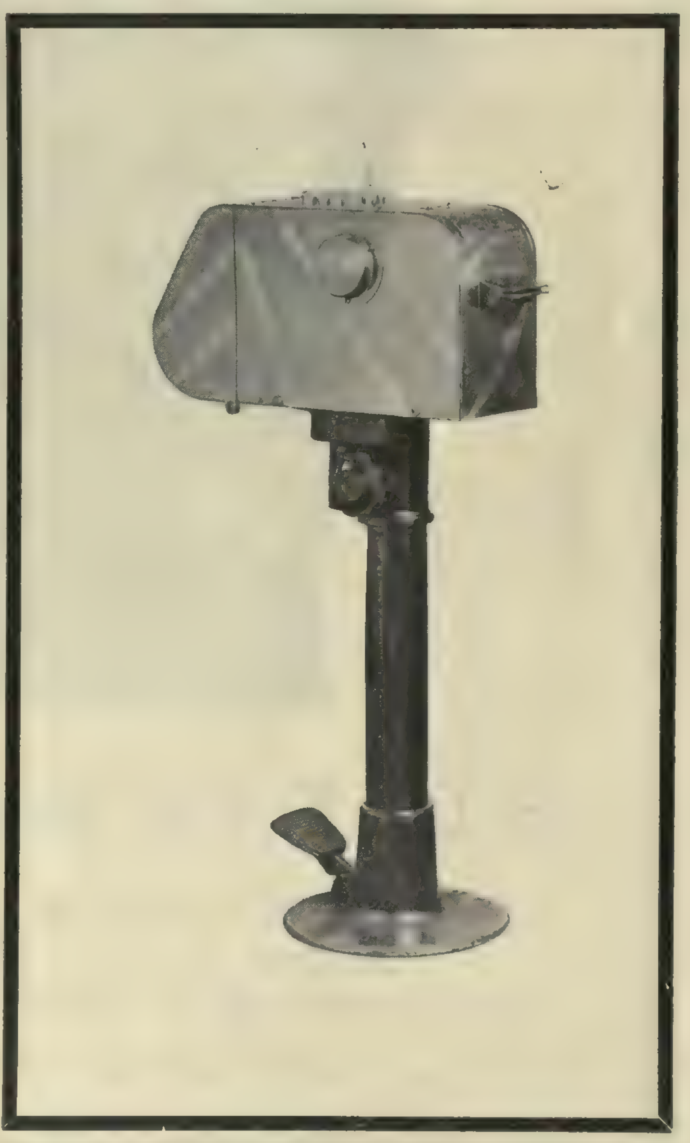
Shanklin Equ

Springfi

ssuing Machines

Schedules

At the present rate of saving, these machines will quickly pay for themselves



Actual operating tests have proven that Shanklin Transfer Issuing Machines make

Quicker schedules possible.

Platform operations are speeded up.

Transfers are issued 60 per minute if necessary.

Transfers are punched correctly, with month, date, destination, time, A.M. or P.M.

Saving of paper will amount to 40 per cent or more by this system.

This machine lightens conductor's work and increases his efficiency.

Each transfer issued correctly accounted for.

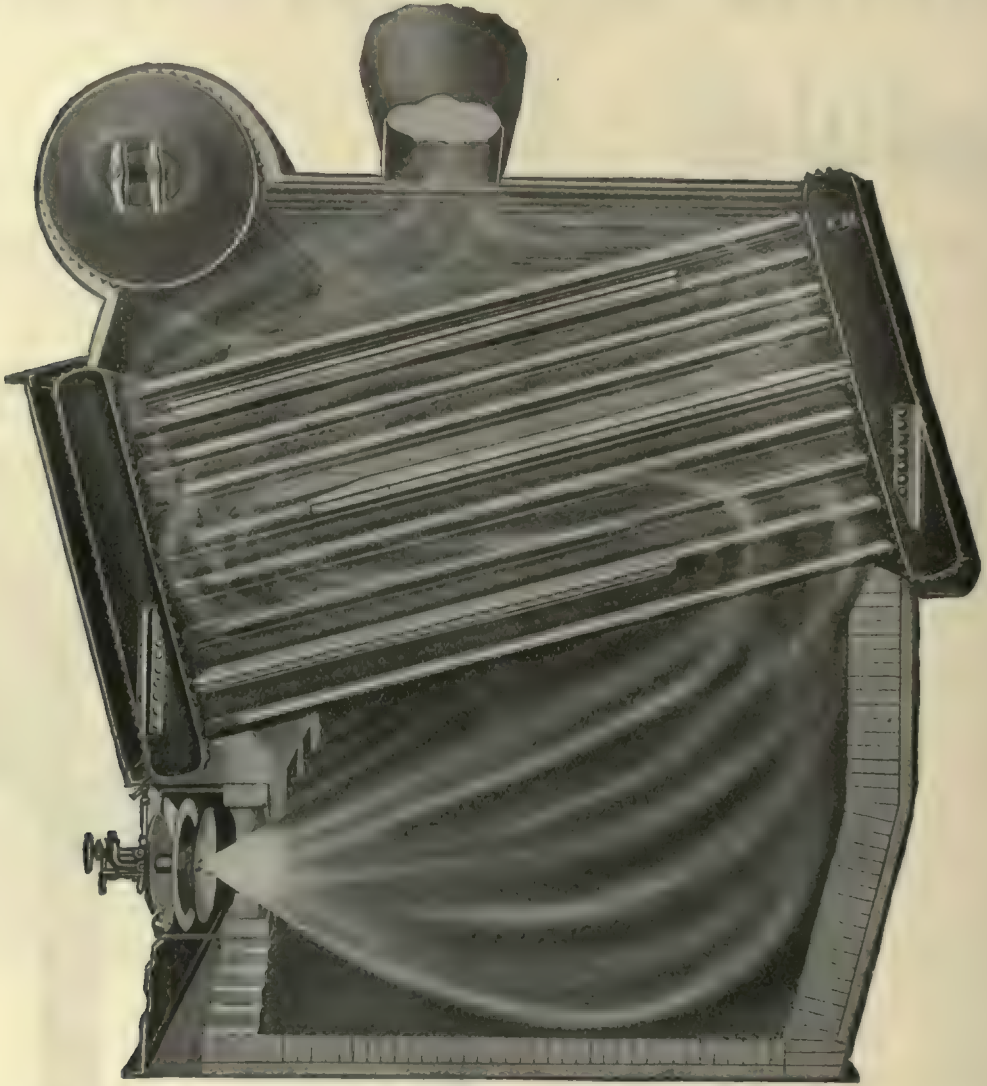
Make your peak periods produce the maximum profit and efficiency.

Submit your transfer and zone problems to our engineers. Let them show you how to better your service.

nent Company

lassachusetts

For the Railway Plant



S & K Oil Burning Equipment

The Koerting Mechanical Oil Burning System insures the highest practical economy in meeting modern railway loads

VALVES
INJECTORS
CONDENSERS
SPRAY NOZZLES
CHEMICAL EQUIPMENT

SCHUTTE & KOERTING
1155 Thompson St. Philadelphia Pa.
New York Boston Pittsburgh Chicago Cleveland Denver

OIL BURNING EQUIPMENT
EVAPORATORS
DISTILLERS
OIL COOLERS
FEED WATER HEATERS

Dolph's

DOLPH'S CHINALAK

Reg. U. S. Patent Office

is unsurpassed for Railway Armature and Field Coils.

Coils impregnated and baked with this superior insulating compound will stand up for indefinite periods in the worst kind of weather.

Chinalak Varnishes, both black and clear, are made with a base of China wood oil. This oil is superior in water resisting properties to any oil heretofore used in the making of varnishes.

Hence the remarkable maintenance records being made with Chinalak treated coils is a natural result.

Chinalak varnishes are "long" in oil, giving them the maximum of elasticity. Yet they may be dried in 6 to 8 hours at 100 to 110° C. The film is tough and pliable, does not become brittle with age and is oil and waterproof.

We also make a full line of black and clear air drying and baking varnishes for insulating, finishing and waterproofing.

We have manufactured Insulating Varnishes and Compounds exclusively since 1909, and feel that our knowledge of the subject warrants us in making recommendations of value.

Send for new catalog describing our products

JOHN C. DOLPH COMPANY

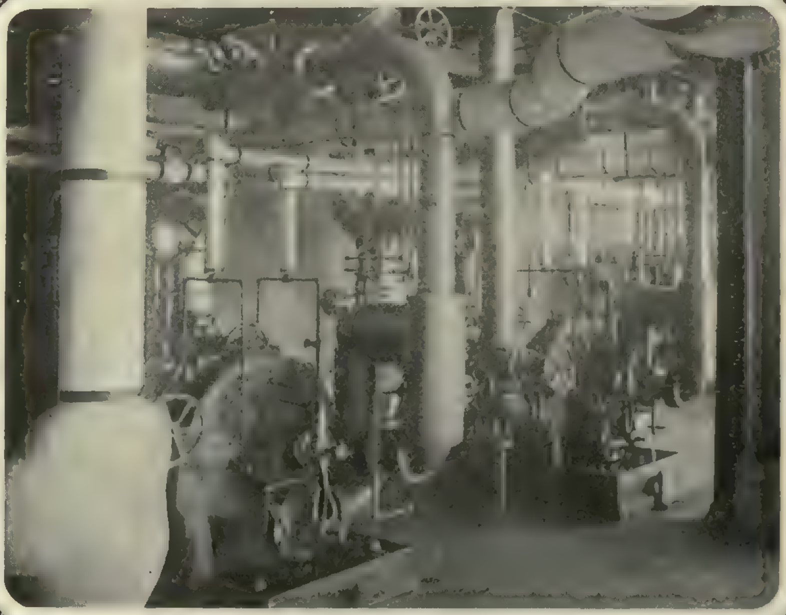
The Insulation Specialists

Newark, N. J.

Represented by

L. L. Fleig & Co., Inc., Chicago and Cleveland
Baker-Joslyn Co., San Francisco, Los Angeles, Seattle
Edgar O. Oeters Co., Philadelphia, Pa.
Kervick Bros., Birmingham, Eng.
Bills & Beach, Pittsburgh, Pa.

For Boiler Feed Service



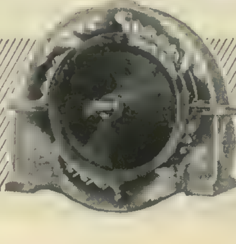
IN plants of 1,000 H.P. or over the centrifugal boiler feed unit has been proved superior to any other type. Its upkeep cost is low, it requires but small space, its even flow of water prevents water hammer and its attendant piping and valve repair costs.

As dependability of operation is most important in this particular class of service, and as Terry turbines have proved their title to dependability, you will find Terry boiler feed units used extensively in the best power plants. Their adaptability to automatic control by means of very simple and positive acting devices makes them particularly valuable for this class of service. Constant pressure or a definite excess pressure may be maintained regardless of the quantity of feed water being pumped.

Many features of superior construction are explained in Bulletin 25. Write for it and for boiler feed unit, large or small—specify

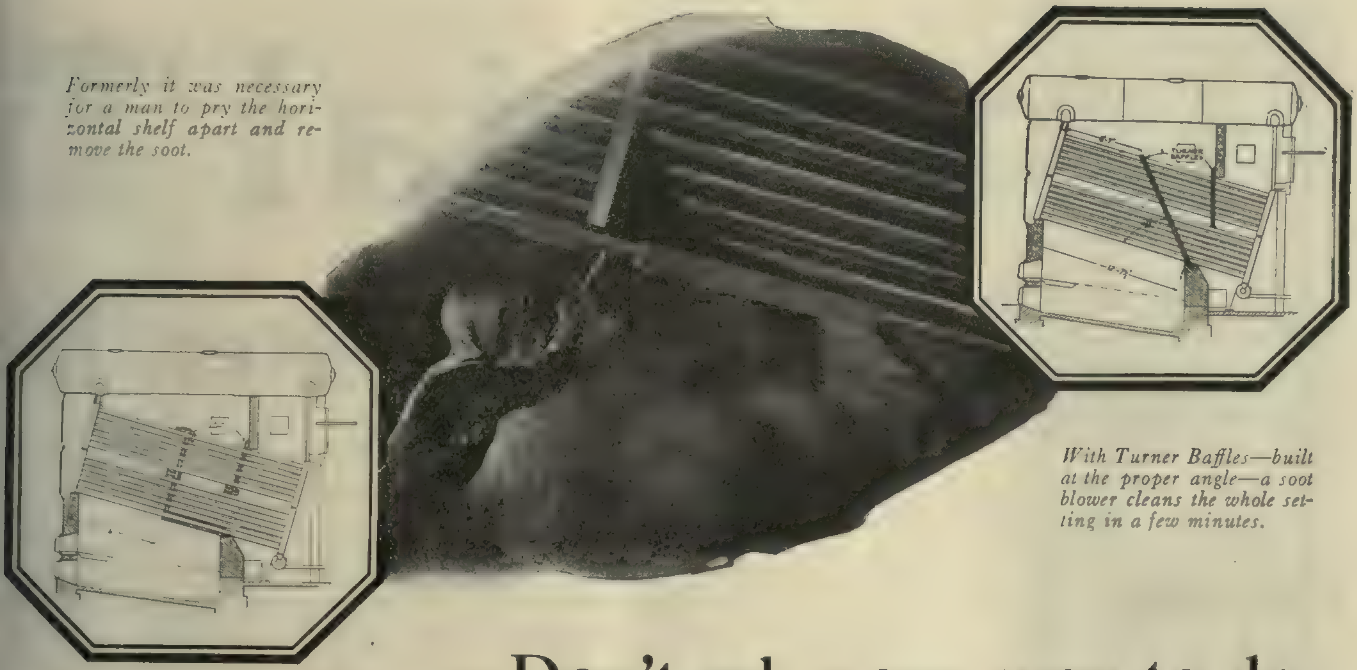
T-737

THE TERRY TURBINE



Offices in Principal Cities
in U.S.A. also in Important
Industrial Foreign Countries

The Terry Steam Turbine C
Terry Sq. Hartford, Conn. U.S.A.



Formerly it was necessary for a man to pry the horizontal shelf apart and remove the soot.

With Turner Baffles—built at the proper angle—a soot blower cleans the whole setting in a few minutes.

Don't ask your men to do this dirty, unhealthful job

Turner Baffles put an end to it. They increase steaming capacity and cut fuel costs.

TURNER Baffle Walls have scored again. At a large public utility plant they have eliminated a disagreeable, unhealthful job that formerly was a frequent necessity.

The old style baffle which permitted soot accumulations on the horizontal shelf was replaced with Turner Baffles, *inclined* at the *correct angle.* Soot blowers now clean the whole boiler in a few minutes. Result: a happier crew and time saved every time they clean.

Another equally important advantage is gained by the wider opening of the first pass. This greatly increases the area of the lower tubes exposed to the radiant heat, decreases gas velocity and provides for more thorough heat absorption. Stack temperatures are lowered, dead spaces eliminated and fuel saved.

Turner Baffles are correcting almost every known boiler trouble because they are the only baffles which can be built at *any angle whatever* to the *tubes.* You can set this positively gas-tight wall into your present plant without moving a brick of the boiler setting.

You will want to know all about Turner Baffle Walls. Send today for "The Development of an Idea." It is full of ideas for saving labor and fuel.

The Costliness of Soot.*

"Soot is the arch enemy of boiler economy. It is five times as good a heat insulator as asbestos Wherever it is allowed to remain there is waste of fuel. There is only one way to fight soot and that is to remove it as it forms."

igured in Dollars

Thickness of soot in inches	LOSS Percent of heat	LOSS Coal at $4.00 a ton.
1/32	9 5	$0.38
1/16	26.2	1.08
1 8	45.2	1.80
3 16	69.0	2.76

*From Industrial Power, January, 1921.

Balanced Draft

Produced exclusively by The Engineer Company

Turner Baffle Walls

Produced exclusively by The Engineer Company

The Engineer Company

17 Battery Place, New York City

ATLANTA
Trust Co. of Georgia Bldg

BOSTON
10 High Street

CHICAGO
1414 S. Michigan Ave.

CLEVELAND
515 National City Bldg.

DETROIT
4610 Woodward Ave.

MILWAUKEE
614 Security Bldg.

ST. LOUIS
701 Pontiac Bldg.

MINNEAPOLIS
Builders' Exchange Bldg.

INDIANAPOLIS
316 Indiana Trust Bldg.

MONTREAL
Coristine Building

WILKES-BARRE, PA.
21 Bennett Building

NEW ORLEANS
847 Baronne Street

PHILADELPHIA
1010 Harrison Building

PITTSBURGH
Jenkins Arcade Building

Imperial T

Make Better Tr

"Imperial" Pneumatic Tie Tampers tamp the
compactly under the ties avoiding the formation c
pockets and reducing subsequent settlement. Actu
have shown that "Imperial" tamped track stands u
average about twice as long as track tamped with t
and bar. Ballast tamped with "Imperials" can be c
with paving with assurance that it will not sag or ne
taken up again for tamping.

Six or seven men, with the aid of "Imperial" Tie T
can do the same amount of work that would be
plished by fifteen or twenty men working with han
A considerable saving in the labor item alone.

"Imperials" also work effectively in places which ca
reached by the ordinary pick and bar. Arounc
switches and crossings they work as well as in an
place, whereas the space is too cramped to permit
of a hand tamping pick.

Ask for a copy of

Ingersoll-

11 Broadway *Of*
NEW YORK *Wo*

Tampers

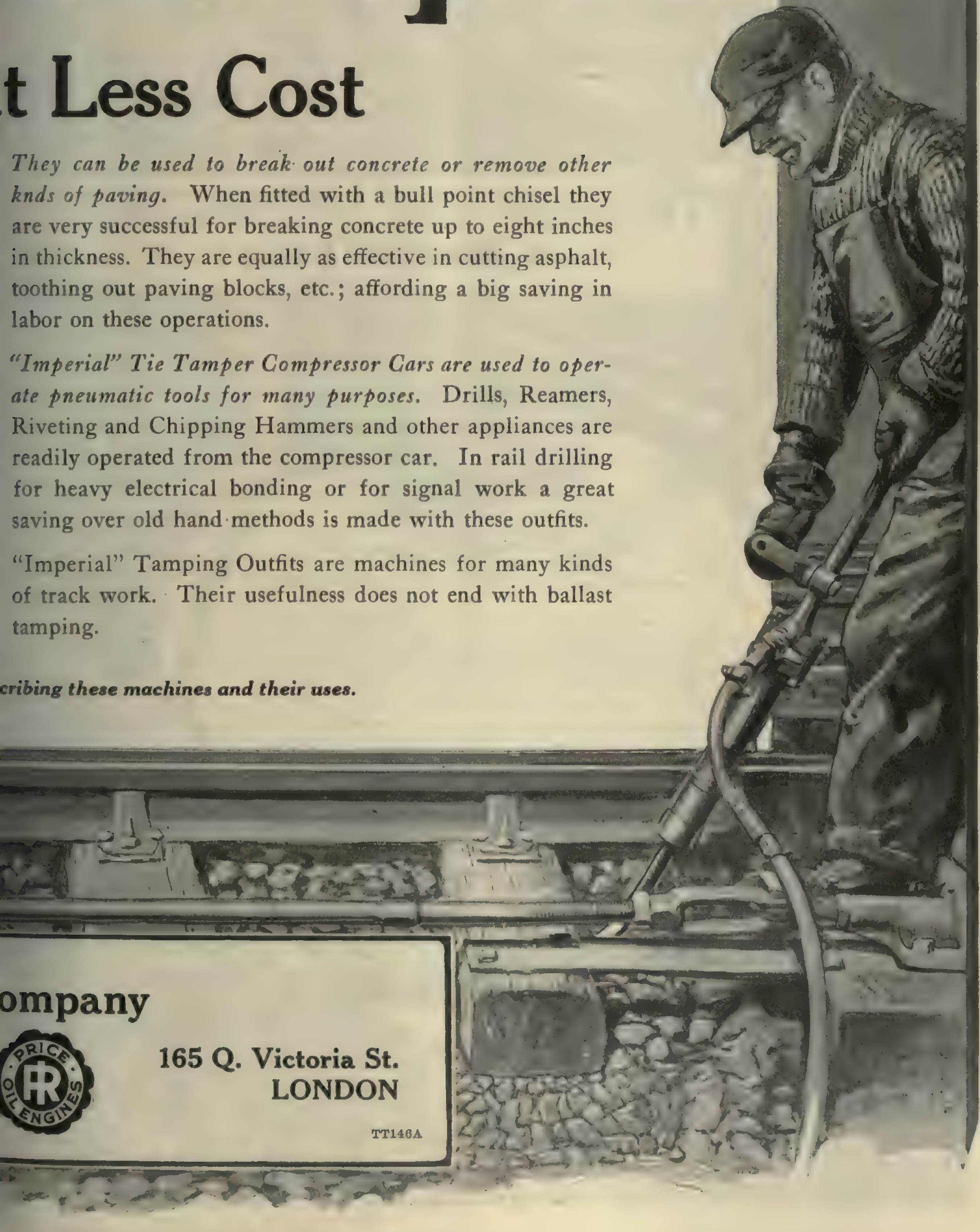
t Less Cost

They can be used to break out concrete or remove other knds of paving. When fitted with a bull point chisel they are very successful for breaking concrete up to eight inches in thickness. They are equally as effective in cutting asphalt, toothing out paving blocks, etc.; affording a big saving in labor on these operations.

"Imperial" Tie Tamper Compressor Cars are used to operate pneumatic tools for many purposes. Drills, Reamers, Riveting and Chipping Hammers and other appliances are readily operated from the compressor car. In rail drilling for heavy electrical bonding or for signal work a great saving over old hand methods is made with these outfits.

"Imperial" Tamping Outfits are machines for many kinds of track work. Their usefulness does not end with ballast tamping.

cribing these machines and their uses.



ompany

165 Q. Victoria St.
LONDON

TT146A

TROLLEY LINE SPECIALTIES

of Superior Quality

There's a whole group of specialties ready to fit your needs

If you have used any "Flood City" trolley line specialties you probably know the usefulness and value of the whole group—Brass or Bronze Bearings, overhead or underground equipment or any of our other materials.

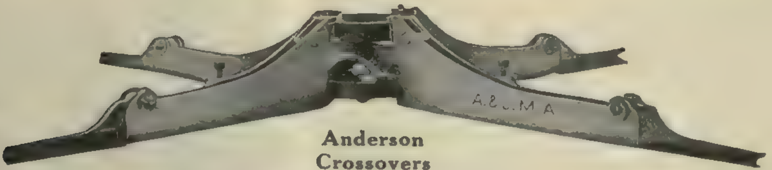
If you have used them you know their built-in qualities—their long life, their slow depreciation. But whether you have or have not used them our current prices will interest you.

Put your problems up to our staff. They are here to work with you—Tell us today of your needs.

Flood City Mfg. Co.
Johnstown, Pa.

ANDERSON Equipment Insures Satisfactory Service

Now for Spring Weather and Rehabilitation *with Anderson Specialties*

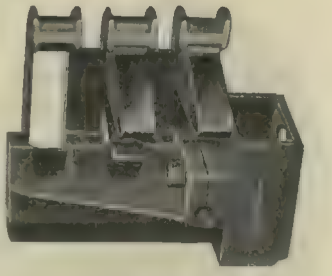


Anderson Crossovers

ANDERSON CROSSOVERS are scientifically made to insure long wear of both crossing and wires. The approach ears of bronze are pivoted to the main casting permitting them to rise slightly with the approach of the trolley wheel, thus taking the wear off the wire at the point subject to the greatest injury. This positively prevents crystallization and the subsequent breaking of the trolley wire at cross-over points.

Canopy Switch

ANDERSON CANOPY SWITCHES have replaced ordinary circuit breakers on thousands of cars because they are quick in action and they never stick. An insulating housing of vulcanized fibre makes it impossible to come in contact with the live parts when the switch is closed. A direct pull is always assured by means of a swivel handle and it is this feature that the motorman likes so well.

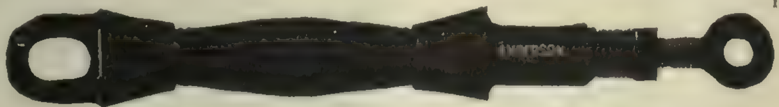


Lindall Brush Holder

LINDALL BRUSH HOLDERS give perfect contact by constant brush pressure contact between brush surface and commutator. This lengthens the life of your commutator and gives better commutation. The long sweep of the double arm compression spring allows instant response to any surface inequalities in the commutator. With Lindall Brush Holders installed, there are no pigtails, no screws to work loose and no trouble as brush is easily removed or inserted.

Round Top Straight Line Suspension

ANDERSON ROUND TOP STRAIGHT LINE SUSPENSIONS are especially strong, both electrically and mechanically. Line Foremen prefer them.



Double Take Up Wood Strain Insulator

ANDERSON DOUBLE TAKE UP WOOD STRAIN INSULATORS absolutely prevent twisting of the guy wire. Moreover they reduce the time in taking up slack to just one-half. Finally they combine the essential features of unlimited insulation, great tensile strength and perfect adjustment.

A letter will bring you our latest catalog and prices on Anderson Specialties.

TRADE A MARK

Reg. U. S. Pat. Off.

Albert & J. M. Anderson Mfg. Co.

Established 1877

289-293 A St., Boston, Mass.

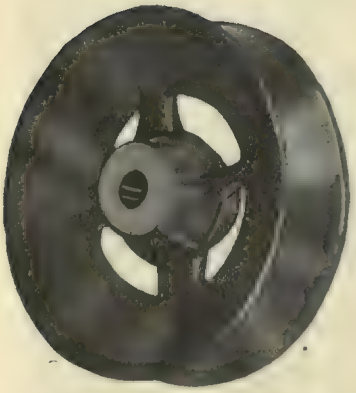
Branches—New York, 135 B'way. Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St. London, 191 Tottenham Court Road.

TRADE AEA MARK
AETNA
REGISTERED

The Careful Workmanship Put into Every Columbia Product Is Reflected in Each and Every Detail

Quality Trolley Wheels

are made in 4, 5 and 6 inch sizes and to your special requirements. Special attention has been given in the selection of material, only such being used as will give long wear and good lubrication.



Columbia Trolley Wheel

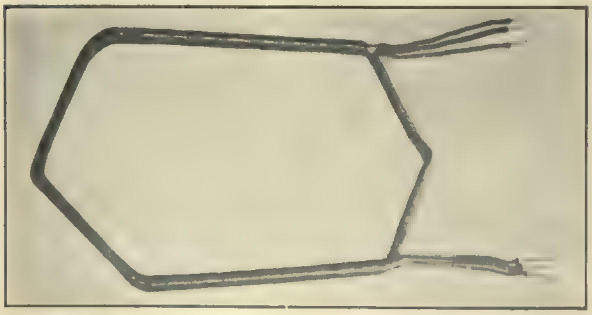
Columbia Bearings

Columbia Quality Bearings

for both axles and armatures made from the bar to the finished product right in our own plant. Their long life and reliability bring continuous repeat orders from hundreds of railways.

Columbia Quality Coils

They are specially designed and wound for rewinding old armatures because unusual care is needed. Additional insulation is always necessary at corners and between leads where the clearance with core is small. In addition, the large radius bends give greater flexibility.



Columbia Coil

Gear Case

Columbia Sheet-Steel Gear Cases

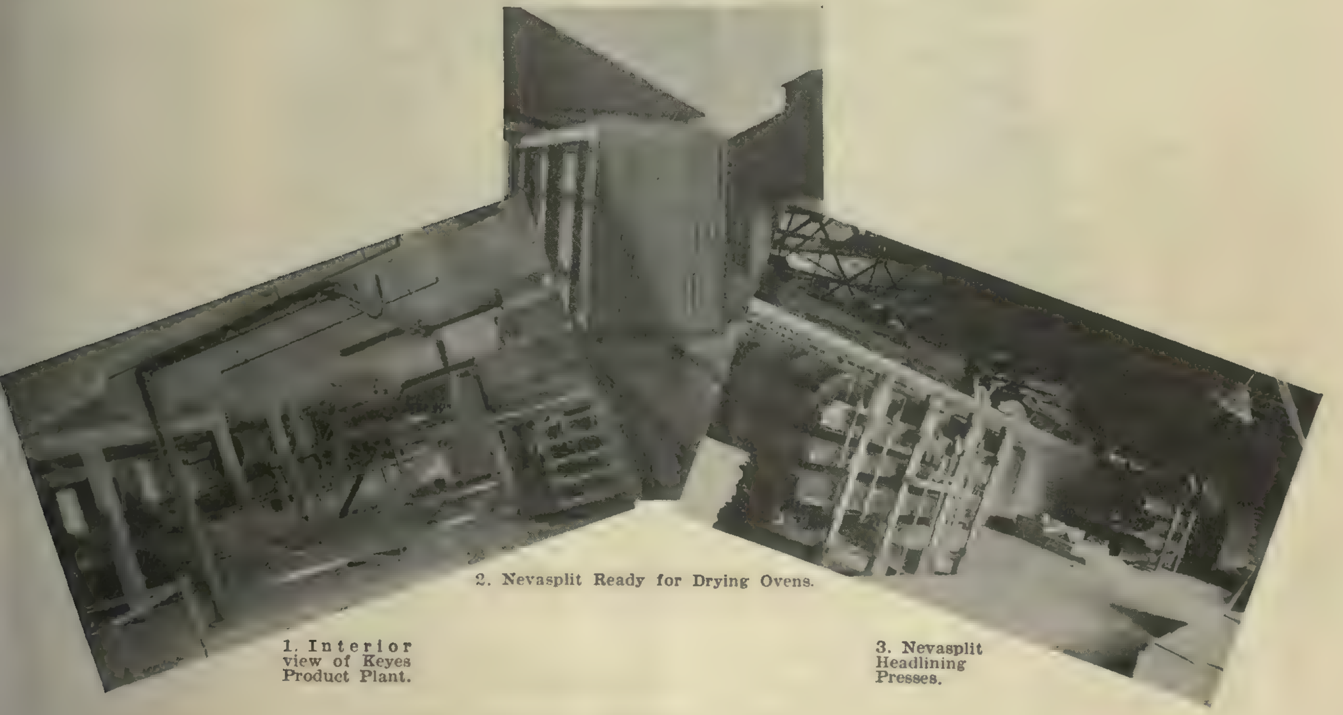
are bump-proof—drag-proof—dust-proof—mud-proof—and their suspension points are fracture-proof. This gear case is but one of a long line of specialties that we make for electric railways.

The Columbia Machine Works & Malleable Iron Company

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

A. A. GREEN, Sales Mgr., 50 Church St., New York City
ERNEST KELLER, Brooklyn, N. Y.
E. ALLISON THORNWELL, 1026-7 Atlantic Trust Bldg., Atlanta, Ga.
J. L. WHITTAKER, 141 Milk St., Boston, Mass.
F. F. BODLER, 903 Monadnock Bldg., San Francisco, Calif.
W. McK. WHITE, 343 South Dearborn St., Chicago, Ill.

Nevasplit Headlining Is Now a Columbia Product. We Are General Sales Agents for the Keyes Products Company



2. Nevasplit Ready for Drying Ovens.

1. Interior view of Keyes Product Plant.

3. Nevasplit Headlining Presses.

NEVASPLIT Headlinings never shrink, warp nor crack. Waterproof and of minimum conductivity, they make car interiors safer and more beautiful. The smooth, even surface takes paint most readily with pleasing results. It reduces the weight of the car and adds to its attractiveness because of better illumination.

Once put up it stays put without warping, splitting or cracking. That is why the Philadelphia Rapid Transit Company recently installed 100 cars equipped with Nevasplit.

The Keyes Products Company, 120 Broadway, New York

Columbia Machine & Malleable Iron Company
50 Church Street, New York
Eastern Sales Agents

Reduce Maintenance Costs

The reduction of vibration to a minimum in electric railway service is the greatest factor in cutting down maintenance costs.

Nuttall Helical Gears are vibrationless, silent and smooth-running. Furthermore, on account of being specially heat treated by the BP process, they are guaranteed to give FOUR TIMES the life of untreated gears in identical service.

Silent operation, free from vibration, long life and reliable service are the distinguishing characteristics that have made Nuttall Helical Gears —**"A Proven Success."**

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

Represented in the United States by the Westinghouse Electric & Mfg. Co.'s district offices.

Nuttall

“DUTCHESS” INSULATING CLOTH

Varnished Cambric

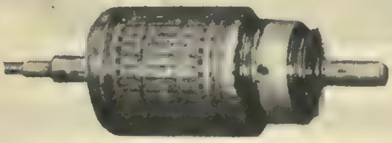
An Electrical Insulation of superior quality made in our own plant under the supervision of our engineering and technical laboratory. “Dutchess” Varnished Cambric is a flexible insulating cloth of high resistance and di-electric strength, especially adapted for the insulation of railway motor and compressor armature and field coils where the insulation is subjected to high temperatures. It has high heat resistance.

We are now prepared to furnish black or yellow cloth in any quantity large or small; in rolls or in straight or bias tape of any desired width.

INSULATING VARNISHES AND IMPREGNATING COMPOUNDS

for apparatus subject to—severe vibration, oil and moisture, acid and alkali fumes, high external heat, dust and grit.

Information covering varnishes suitable for any service together with most recent methods of application and insulating equipment furnished on application.



Electrical Insulation *made by* Electrical Engineers

American Di-Electrics, Ltd.
95 Liberty Street, New York

Made Ready for Uninterrupted Service

IRVINGTON INSULATIO

THIS armature from now on, is going to give real service—service uninterrupted by costly burnouts. The best insurance against troubles of this nature is to insist on IRVINGTON INSULATING PRODUCTS being used in your equipment—for the following reasons:

High dielectric strength gives added protection.
High resistance reduces leakage to a minimum.
The flexibility of Irvington Products increases speed and efficiency of production without impairing standards.
Non-Hygroscopic—therefore no leakage due to atmospheric changes.
Heat resisting makes it immune to the dangers of overheating.
Somewhere in the list on the opposite page is the insulating product you want.

Samples and data gladly sent upon request

IRVINGTON VARNIS

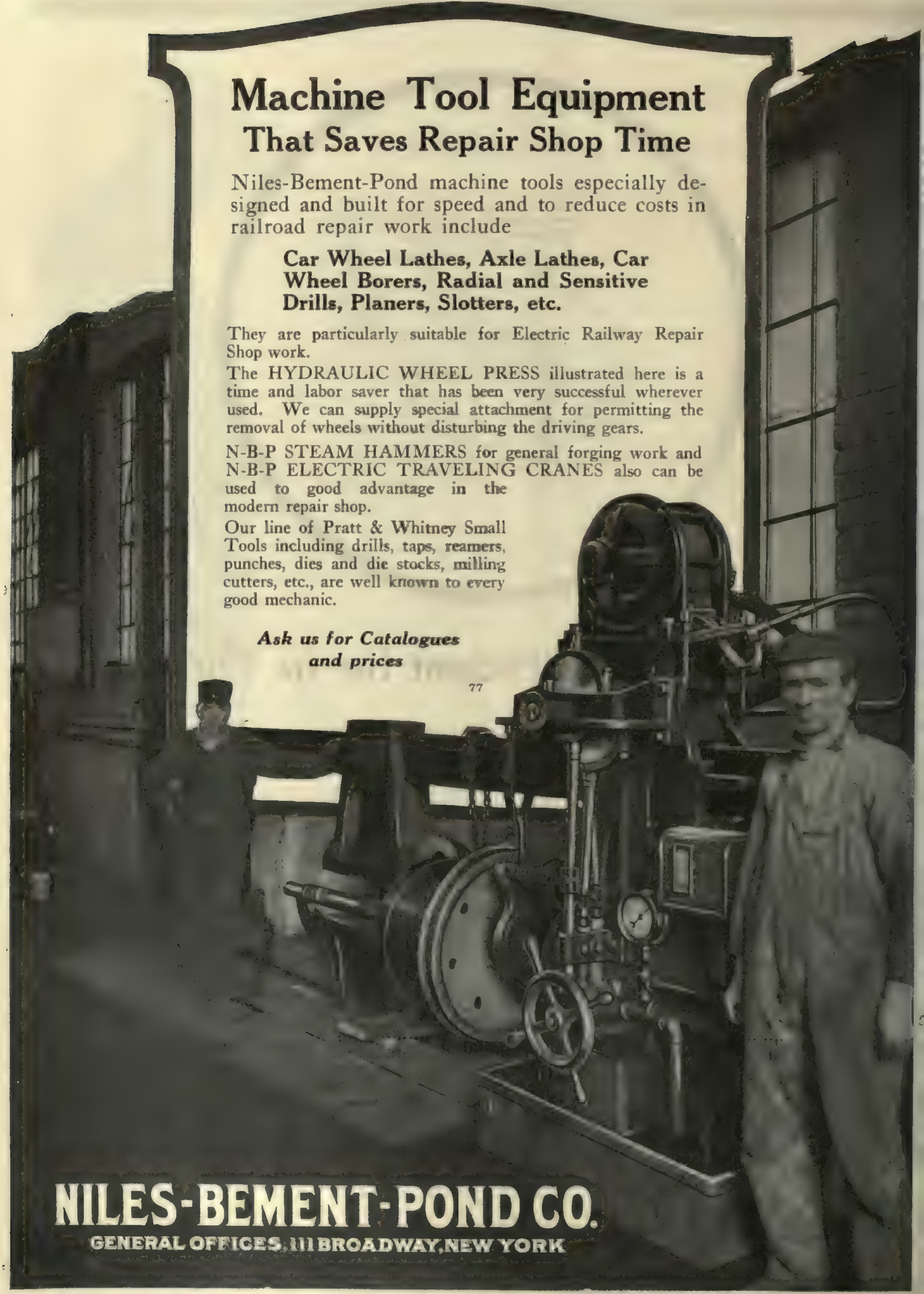
IRVINGTO

Each Equally Efficient for its Purpose

Black and Yellow Varnished Cambric
Black and Yellow Bias Cambric Tape
Oiled Silks Oiled Papers
Black and Yellow Insulating Varnishes
Black and Yellow Flexible Varnished Tubing

Irvington Slot Insulation
Cellulak Tubing
Cellulak Plates

& INSULATOR CO.
EW JERSEY



Machine Tool Equipment
That Saves Repair Shop Time

Niles-Bement-Pond machine tools especially designed and built for speed and to reduce costs in railroad repair work include

Car Wheel Lathes, Axle Lathes, Car Wheel Borers, Radial and Sensitive Drills, Planers, Slotters, etc.

They are particularly suitable for Electric Railway Repair Shop work.

The HYDRAULIC WHEEL PRESS illustrated here is a time and labor saver that has been very successful wherever used. We can supply special attachment for permitting the removal of wheels without disturbing the driving gears.

N-B-P STEAM HAMMERS for general forging work and N-B-P ELECTRIC TRAVELING CRANES also can be used to good advantage in the modern repair shop.

Our line of Pratt & Whitney Small Tools including drills, taps, reamers, punches, dies and die stocks, milling cutters, etc., are well known to every good mechanic.

Ask us for Catalogues and prices

77

NILES-BEMENT-POND CO.

GENERAL OFFICES, 111 BROADWAY, NEW YORK

DAHLSTROM
Metal Mouldings & Shapes

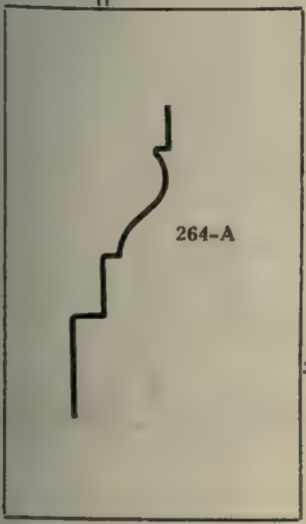
Build for permanence and low maintenance costs

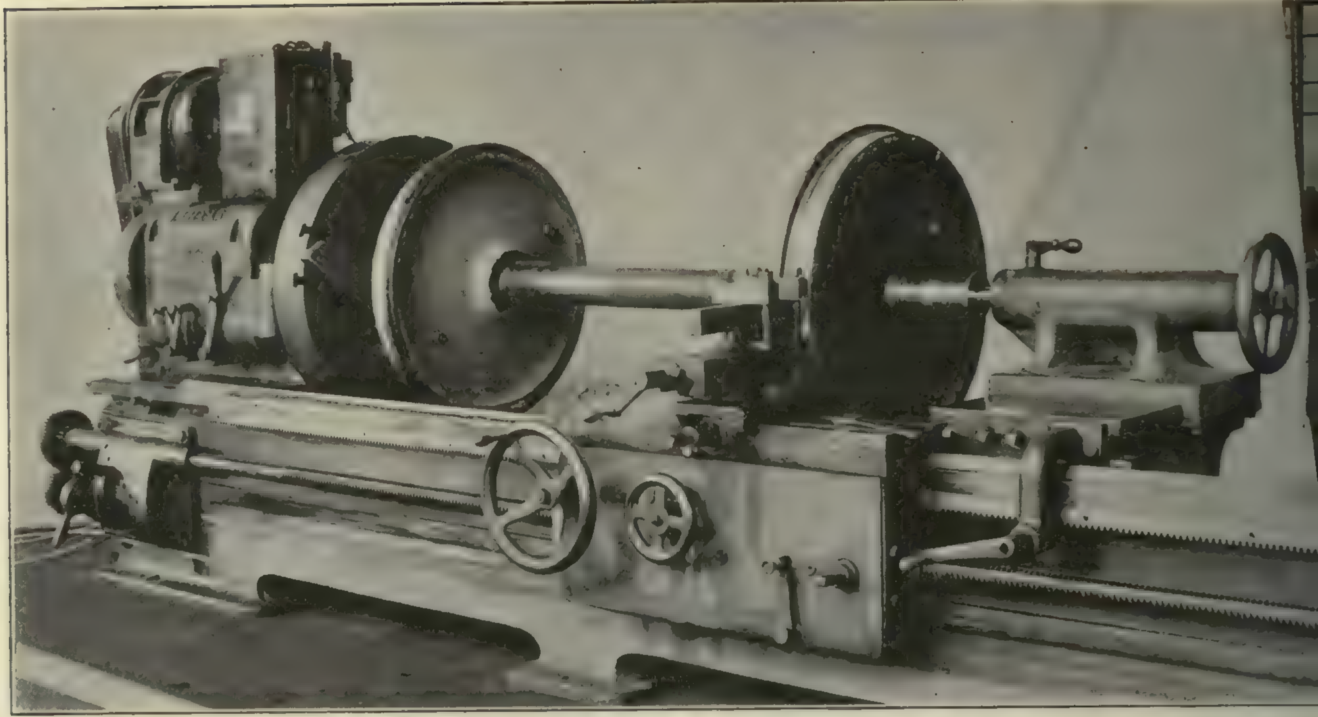
DAHLSTROM METAL ELECTRIC CAR SHAPES

Steel trim has meant big savings for electric street and interurban car lines. Wherever used it has cut maintenance cost to the bone in such factors as mouldings, glass channels, window sash, window stools and beams, siding and doors—in fact wherever used in place of wood.

The Dahlstrom line of metal mouldings and shapes for car work drawn from stock dies, is most complete. Catalog, listing the full line, sent upon your request.

Dahlstrom Metallic Door Co.
431 Buffalo St., Jamestown, N. Y.





Showing McCabe's All-in-one" Lathe 24-40-in. Swing—turning Car-Wheels

It Costs Half the Price of a Wheel Lathe But Does Twice the Work

McCabe

"All-in-1"

For Your Wheel Work

no machine will answer better than the "All-in-1." Ample swing, rigidity of bed and carriage, sufficient power, correct cutting speeds and accuracy of adjustment insure the requisite qualities for wheel truing of the finest workmanship and to the closest gage tolerances.

McCabe's All-in-1 Lathes are all-around machines when it comes to turning out a dozen different jobs in a railway shop.

Wheel work, of course, comes first. For this the McCabe All-in-1 is remarkably equipped.

But what's the use of having a lathe for wheel work alone. The McCabe All-in-1 does all of your other work such as motor bearings, commutators, axles and other repair jobs that require a greater range of capacities, feeds and speeds.

Why not install the lathe whose range and flexibility of operation allow all work to be handled with the same ease that characterizes it when doing wheel-lathe work?

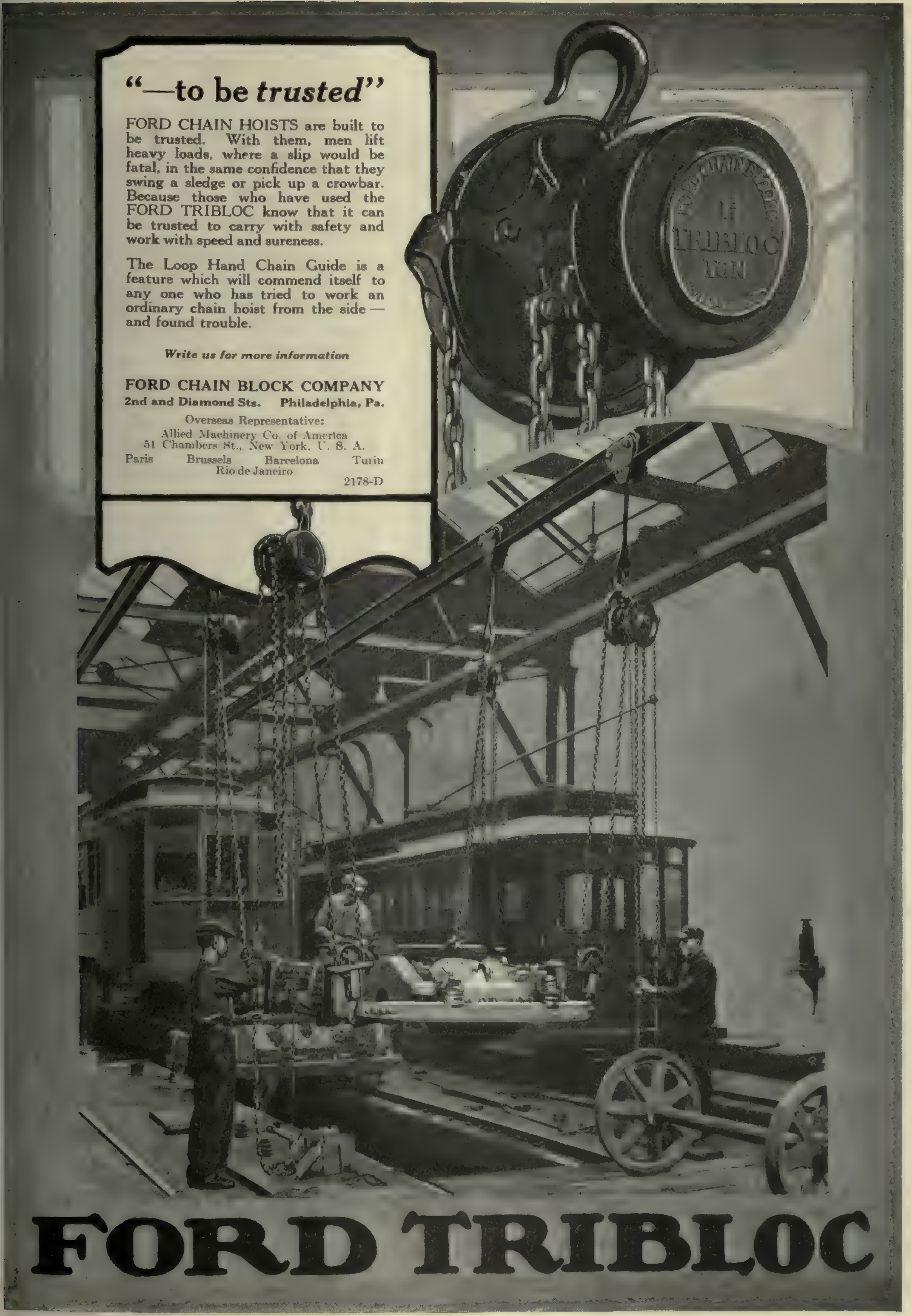
And especially when a McCabe All-in-1 Lathe sells at half the cost of a wheel lathe.

Le us tell you how you can cash in on our plan. A letter will bring a return reply.

Save your company half the price of a Car-Wheel Lathe

J. J. McCabe Lathe & Machinery Cor

149 Broadway, New York City



"—to be *trusted*"

FORD CHAIN HOISTS are built to be trusted. With them, men lift heavy loads, where a slip would be fatal, in the same confidence that they swing a sledge or pick up a crowbar. Because those who have used the FORD TRIBLOC know that it can be trusted to carry with safety and work with speed and sureness.

The Loop Hand Chain Guide is a feature which will commend itself to any one who has tried to work an ordinary chain hoist from the side—and found trouble.

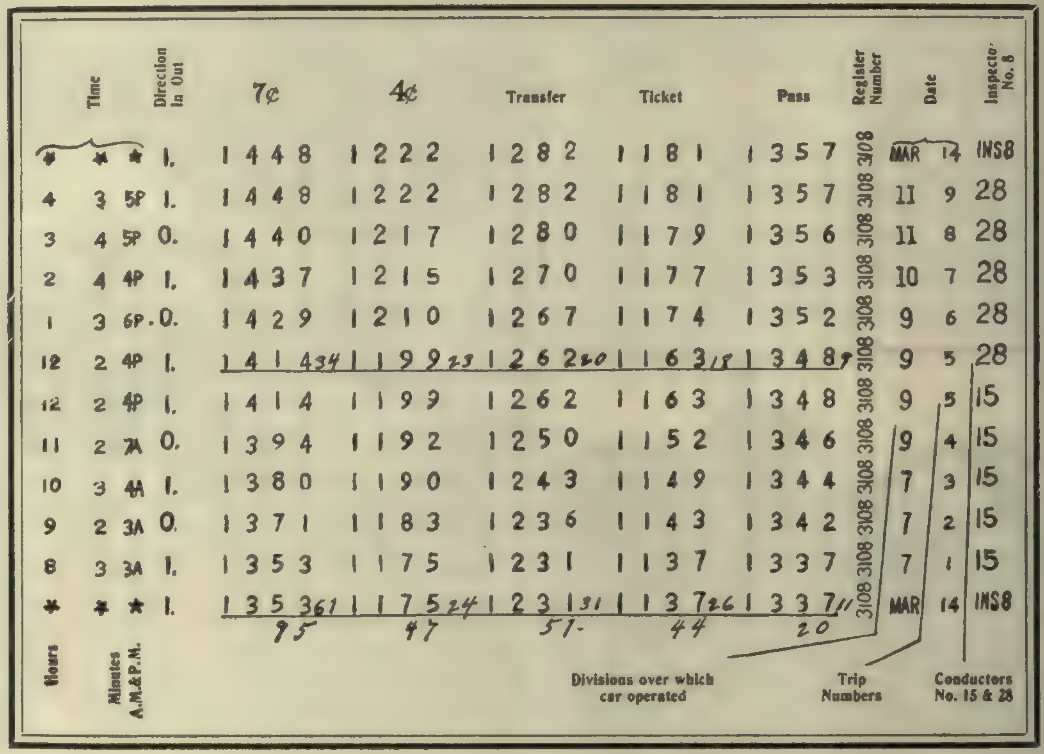
Write us for more information

FORD CHAIN BLOCK COMPANY
2nd and Diamond Sts. Philadelphia, Pa.

Overseas Representative:
Allied Machinery Co. of America
51 Chambers St., New York, U. S. A.
Paris Brussels Barcelona Turin
Rio de Janeiro

2178-D

The Ohmer System



Time			Direction In Out	7¢	4¢	Transfer	Ticket	Pass	Register Number	Date		Inspecto- No. 8
*	*	*	I.	1448	1222	1282	1181	1357	3108	MAR	14	INS8
4	3	5P	I.	1448	1222	1282	1181	1357	3108	11	9	28
3	4	5P	O.	1440	1217	1280	1179	1356	3108	11	8	28
2	4	4P	I.	1437	1215	1270	1177	1353	3108	10	7	28
1	3	6P	O.	1429	1210	1267	1174	1352	3108	9	6	28
12	2	4P	I.	1414 34	1199 23	1262 20	1163 18	1348 9	3108	9	5	28
12	2	4P	I.	1414	1199	1262	1163	1348	3108	9	5	15
11	2	7A	O.	1394	1192	1250	1152	1346	3108	9	4	15
10	3	4A	I.	1380	1190	1243	1149	1344	3108	7	3	15
9	2	3A	O.	1371	1183	1236	1143	1342	3108	7	2	15
8	3	3A	I.	1353	1175	1231	1137	1337	3108	7	1	15
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				95	47	51-	44	20				
Hours	Minutes	A.M.&P.M.										

Divisions over which car operated

Trip Numbers

Conductors No. 15 & 28

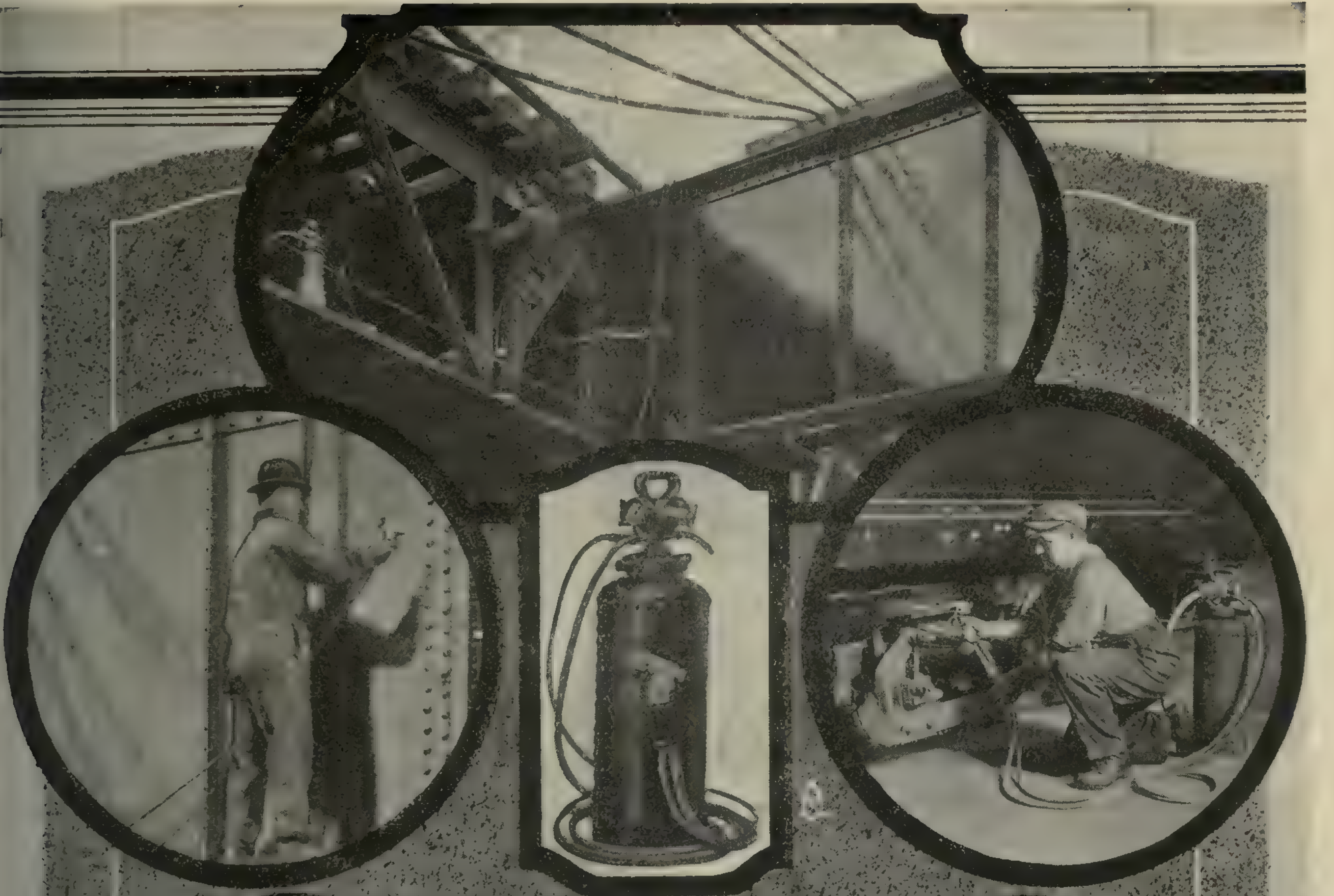
Printed records of transportation sales in street cars are necessary for the proper conduct of an electric railway.

Ohmer Fare Registers record immediately every transaction in such a way that no alterations are possible.

The amount of each fare is clearly indicated to the passenger when the record is made.

Manipulation, dishonesty and carelessness are reduced to a minimum. Loyalty, efficiency and co-operation are increased to a maximum.

Ohmer Fare Register Company
Dayton, Ohio



SPRACO

PNEUMATIC PAINT GUN

1,000 Square Feet Per Day
OR
8,000 Square Feet Per Day

WHICH?

What is the efficiency of your painting gang per man per day—1,000 or 8,000 sq. ft.?

Who ever heard of a man painting 8,000 sq. ft. of surface in one day?

No one, until the SPRACO PAINT GUN came on the market and demonstrated its ability to do this with ease. In fact, it is not unusual for a good worker to cover 10,000 sq. ft. a day and do as good a job as an experienced painter with a hand brush.

Send today for Bulletin No. P-40

and learn how others have reduced their maintenance costs.

Spray Engineering Company
Boston, Mass.
Members of the Amercan Electric Railway Association

Manufacturers also of Spraco Air Washers and Cooling Ponds, Spraco High Temperature Cement Sprayers, Spraco Nozzles, Vaughan Flow Meters, etc.

Type
R-5
Double Register

Type R-10. Single Register

International Registers

TO handle present-day odd cent fares and changing fares in an accurate, dependable system of collection and registration some method of checking load against receipts is necessary.

International Registers with their visible and audible registration at the time fare is received provide an adequate system for continuous service, immediately meeting any change in fare without any change in collection methods or equipment.

Registers for many conditions and classes of service are made by the International Register Company. All these are quality machines, properly designed and built for accurate registration and long enduring service with minimum repairs or replacements. The effectiveness and adaptability of International Registers has been proven by more than twenty years' service on leading electric railway and city systems throughout the country.

Exclusive selling agents for

HEEREN ENAMEL BADGES

The International Register Co.
15 South Throop St., Chicago, Illinois

Much depends on the Tickets and Transfers you issue

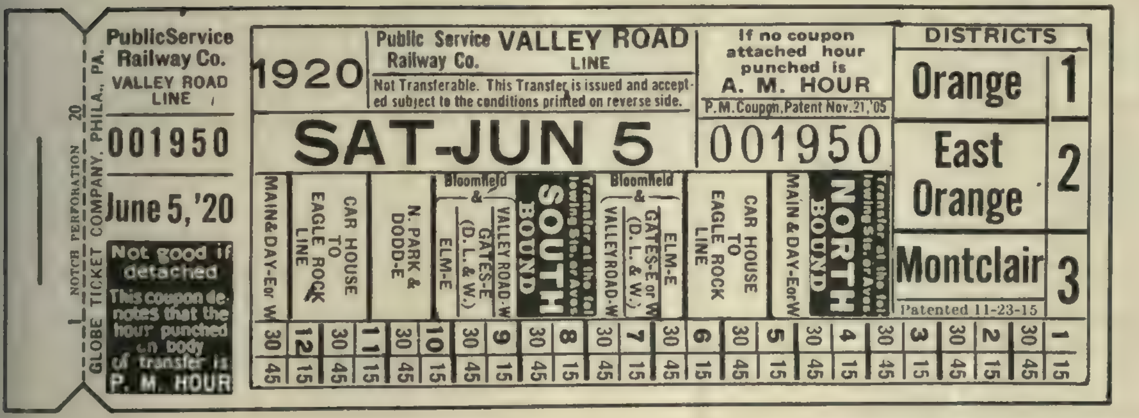
GLOBE FARE TICKETS

Have you stopped to consider the importance of issuing fare tickets designed to care for the particular conditions of service on your lines?

Globe fare tickets can save and earn for you more than you probably can estimate.

They speed up loading and stimulate riding. These tickets are sold in book and strip form to be torn off as used. Even with higher fares riding has increased on lines upon which fares are paid by tickets. The convenience of tickets, and the fact that people will ride more frequently when they have tickets than if paying cash fares has a marked effect upon receipts.

Shall we send you samples of effective fare tickets?



GLOBE TICKET COMPANY, PHILA., PA. 20 NOTCH PERFORATION

PublicService Railway Co.
VALLEY ROAD LINE

001950

June 5,'20

Not good if detached
This coupon denotes that the hour punched on body of transfer is P. M. HOUR

1920

Public Service Railway Co. VALLEY ROAD LINE

Not Transferable. This Transfer is issued and accepted subject to the conditions printed on reverse side.

If no coupon attached hour punched is A. M. HOUR

P.M.Coupon.Patent Nov.21,'05

SAT-JUN 5

001950

DISTRICTS

Orange 1

East Orange 2

Montclair 3

Patented 11-23-15

MAIN&DAY-E or W
CAR HOUSE TO EAGLE ROCK LINE
N. PARK & DODD-E
Bloomfield & ELM-E
GATES-E (D. L. & W.)
VALLEY ROAD-W
SOUTH BOUND
Transfer at the following Sts. or Aves
Bloomfield & ELM-E
GATES-E or W (D. L. & W.)
VALLEYROAD-W
CAR HOUSE TO EAGLE ROCK LINE
MAIN & DAY-E or W
NORTH BOUND
Transfer at the following Sts. or Aves

30 45 | 12 15 | 30 45 | 11 15 | 30 45 | 10 15 | 30 45 | 9 15 | 30 45 | 8 15 | 30 45 | 7 15 | 30 45 | 6 15 | 30 45 | 5 15 | 30 45 | 4 15 | 30 45 | 3 15 | 30 45 | 2 15 | 30 45 | 1 15

P. M. COUPON TRANSFERS

There is no other transfer that gives such instantaneous action, such protection from transfer abuses, as the P. M. Coupon style.

On one-man cars much time may be saved—for there is no punching or P. M.—the coupon eliminates the necessity for that.

They have been used continuously by some of the largest systems for more than fifteen years.

GLOBE TICKET COMPANY
112-114 North 12th Street
Philadelphia, Pa.

DU PONT FABRIKOID

For service, beauty and economy

THOUSANDS of steam and electric railway cars are now upholstered in Craftsman Fabrikoid.

This strong, long-lasting material has a smooth, tough surface which is impervious to dirt or dust and which is not stained by perspiration, soot or grease. Fabrikoid is scuff-proof, tear-proof and immensely durable, yet it is pliable, soft and perfectly comfortable.

Fabrikoid is made in many beautiful colors and grains. A railway in California has upholstered its cars in pure white Fabrikoid—they can do this because Fabrikoid always reveals its original beauty when washed with ordinary soap and water.

Craftsman Fabrikoid upholstery costs less than any other kind, yet it wears longer and is more easily cared for. We will gladly refer you to railway men who have used Fabrikoid for years and who will use nothing else.

Samples and complete details will be mailed upon request.

E. I. du Pont de Nemours & Co., Inc.
***Sales Dept.*, Fabrikoid Division**
Wilmington, Delaware

Branch Offices:

Harvey Building	Boston, Mass.
McCormick Building	Chicago, Ill.
Gugle Building	Columbus, Ohio
Dime Bank Building	Detroit, Mich.
Merchants Bank Building	Indianapolis, Ind.
21 East 40th Street	New York City
Chronicle Building	San Francisco, Cal.

Plant: Newburgh, N. Y.

Fabrikoid Car Curtain Materials are beautiful, long lasting and cleanable. Made in a variety of attractive patterns in fast, unchanging colors. They are easy to keep up and a real economy.

FABRIKOID

F.C.S. Wheels

have the Right Material in the Right Place

The surface of tread and flange contains three and one-half per cent carbon white iron, harder than tool steel, insuring long wear.

The softer hub permits easy machining.

The arched face plate gives additional strength

Reasons why you should use GRIFFIN F. C. S. WHEELS

Less wearing away of metal of the flange.

Less chance for derailment at switch points and on curved worn rail because of freedom from sharp flanges.

Less wearing away of metal at the gauge of rail because the rubbing friction is at a minimum.

Less resistance to movement of the car.

Less resistance on curves.

Less power required for traction.

Less metal worn away from brake shoe per unit of work.

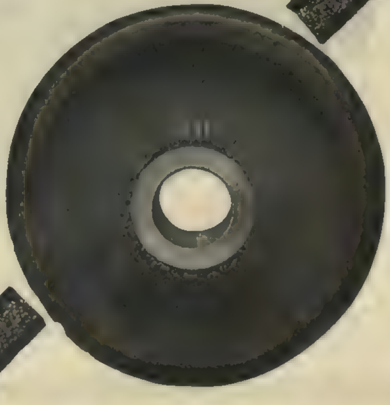
Less reduction in diameter per unit of service, therefore less labor in removing wheels to maintain the same diameter of wheel throughout the same car.

Griffin Wheel Company

McCormick Building, Chicago, Ill.

FOUNDRIES:

Chicago Detroit Boston Los Angeles Denver
St. Paul Tacoma Kansas City Council Bluffs



Distinguished by the Spot

Is Your Trolley Cord Giving 100% Service?

If the trolley cord you are using isn't satisfactory in every respect—if it gets rough, doesn't wear well, is affected by dampness—you should know that a cord of unusual merit.

SAMSON
Spot Trolley Cord

is giving honest service on hundreds of systems. It is distinguished by the Colored Spots—our trade mark. Waterproofed to withstand weather action; non-swelling and smooth. Made of extra quality cotton yarn, firmly braided, and smoothly finished.

Samson Bell and Register Cords

are made in all sizes and colors with wire center, if desired. They are unsurpassed for service.

Every executive should investigate these cords. Drop us a line and we will send samples and prices.

Samson Cordage Works
Boston, Mass.

Rita

All forms of life are relative, say the Hindus.

Although Man is the king pin of the whole natural order of things, the thread of his life is spun out of the same material as that of the green frog in the marsh, or the spotted cobra of the jungle trail.

Whether bird, tree, fish of the sea, or the *genus homo,* all belong to the same natural scheme and are regulated by Rita, or righteousness.

Carbon brushes are much the same, in the sense that all are intended to serve a common purpose. But the 'purpose' assumes so many variations that it is almost impossible to pick the right brush for *your* operating conditions with only catalog illustrations to guide your judgement.

The Morganite method is best; the Morganite engineer first determines the *cause* of brush trouble—then specifies the brush which exactly fills the bill.

Sensible, isn't it?

Morganite Brush Co., Inc.

Main Office and Factory: 519 West 38th Street, New York

DISTRICT ENGINEERS AND AGENTS:

Electric Power Equipment Corp., 13th and Wood Sts., Philadelphia

Electrical Engineering & Mfg. Co., First National Bank Bldg., Pittsburgh

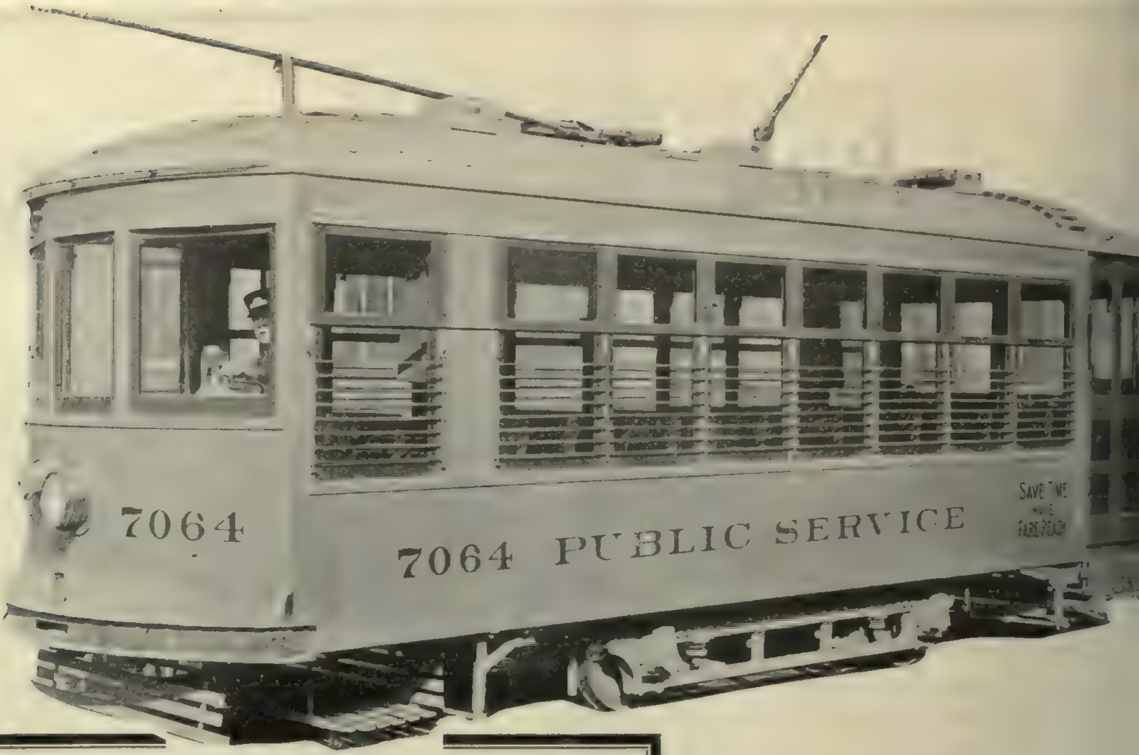
R. W. Lillie Corporation, 176 Federal St., Boston, Mass.

W. R. Hendey Co., Hoge Bldg., Seattle

Herzog Electric & Engineering Co., 150 Steaurt St., San Francisco

Charles Farnham, I. W. Hellman Bldg., Los Angeles

Railway & Power Engineering Corporation, Ltd., 131 Eastern Ave., Toronto, Ontario, Canada



Why Large, Progressive Railways Insist on H-B Life Guards

YEARS of Constant Service on all types of cars in every nook and corner of the United States, Canada and Cuba is largely responsible for its being specified on practically every large order for safeties.

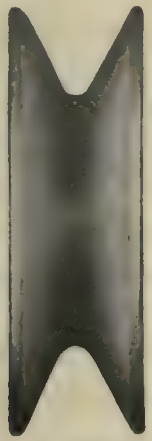
Constant demand over a long period of years is conclusive evidence of the value and reliability of any device.

But a most important factor that has in many instances caused railway executives finally to decide on H-B Life Guards has been their constant life-saving record from year to year.

The H-B Life Guard picks up the fallen pedestrian and carries him to safety, it does not roll him along. It is Automatic, Instantaneous and Positive in action.

The Consolidated Car Fender Co.
Providence, R. I.
General Sales Agents
WENDELL & MACDUFFIE CO., 61 Broadway, N. Y.

"BAYONET" PRACTICE



"U"

Means Insurance of Efficiency from Car Roof to Trolley Wire

Speed and safety will result from the continuous use of Bayonet Equipment. Inspection is the keynote to perfect trolley service no matter whose trolley you use, but the Bayonet way makes it easy.

Bayonet Special Trolley Wheels are made from the highest grade metal and are hand turned, insuring greatest accuracy and balance.

Bayonet Detachable Trolley Harps are the only trolley harps with which you can change from wheel to sleet cutter or to a new wheel in ten seconds. No tools required on top of the car. Inspections, repairs, adjustments and lubricating done at work bench later on when no schedules are being held up.

Bayonet Trolley Base with Detachable Pole Clamp is the only trolley clamp made on which the trolley pole can be changed in 30 seconds and the wheel be in perfect alignment with the wire. No tools are required to do this job. It prevents schedules being delayed. A uniform wire pressure at all angles of the pole is obtained, thus saving on your overhead, wheel and wire.

Bayonet Sleet Cutter cuts the ice like a blaze of fire and saves the wire. It lessens the weight on end of pole and increases pressure against the wire when greater pressure is needed to cut the ice.

BAYONET TROLLEY HARP CO., Springfield, Ohio

LOWEST Maintenance
Boyerize

A Little Neglect May Breed Great Mischief

For want of a nail the shoe was lost;
For want of a shoe the horse was lost; and
For want of the horse the rider was lost, being
overtaken and slain by the enemy—
All for the want of a little care about a horse-
shoe nail.

BENJAMIN FRANKLIN.

Watch the "Nails" and "Cotterpins" on Your Own Property

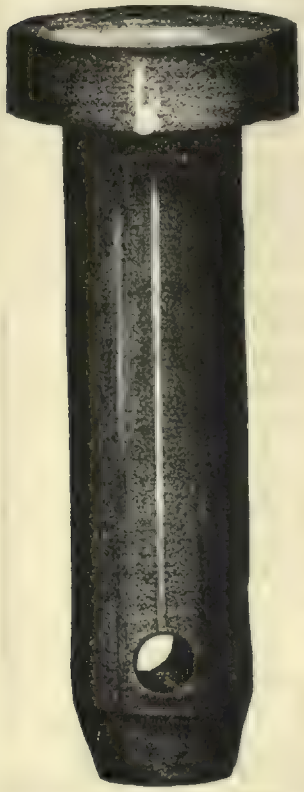
THESE two pictures and the sensible talk that goes with them are from a "Safety First" circular distributed by the Liberty Mutual Insurance Company.

We're mightily pleased, of course, to see this emphasis placed upon the *small* things that bear *big* responsibilities.

We're all the more pleased because we used the same idea in our advertisement of March 13, 1920.

The pins and bushings that go into your brake-rigging are not only *little* things, but they also go into places that are none too convenient to inspect—especially in wintry weather.

Therefore, the longer their life, the less your risk.

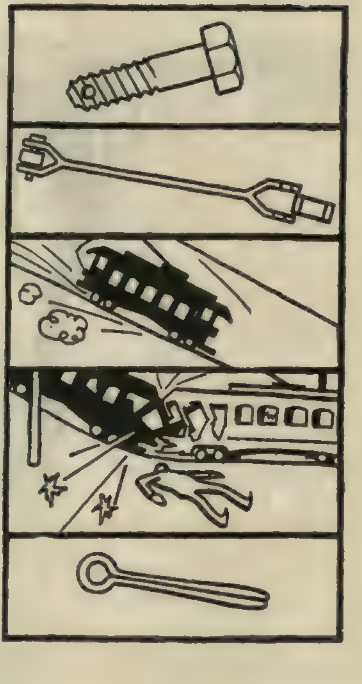


Bemis Car Truck Company
Electric Railway Supplies
Springfield, Mass.

Greatest Safety
Boyerize

As Applied to Modern Conditions This Might Read

For want of a cotterpin the bolt was lost,
For want of a bolt the brake was lost,
For want of a brake the control of the car was lost, and
For want of control a life was lost—
All for the want of a little care about a cotterpin.



That's why hundreds of electric railways have determined to use *only* Boyerized Pins and Bushings.

These railways want to leave nothing undone to reduce he chance of accident.

They know that an article that will serve *safely* several undred thousand miles, whether the brake-rigging man sees it or not, is not only bound to be more economical rom a purely shop point of view but also from the transortation and safety engineer's point of view.

Vhat we have said about Boyerized Pins and Bushings oes 100% for these other Boyerized long-life specialies, too.

Other Long-Life Specialties Are:

oyerized Brake Lever Pins and Bushings.

oyerized Wearing Plates between the Pedestal Straps and the Journal Box.

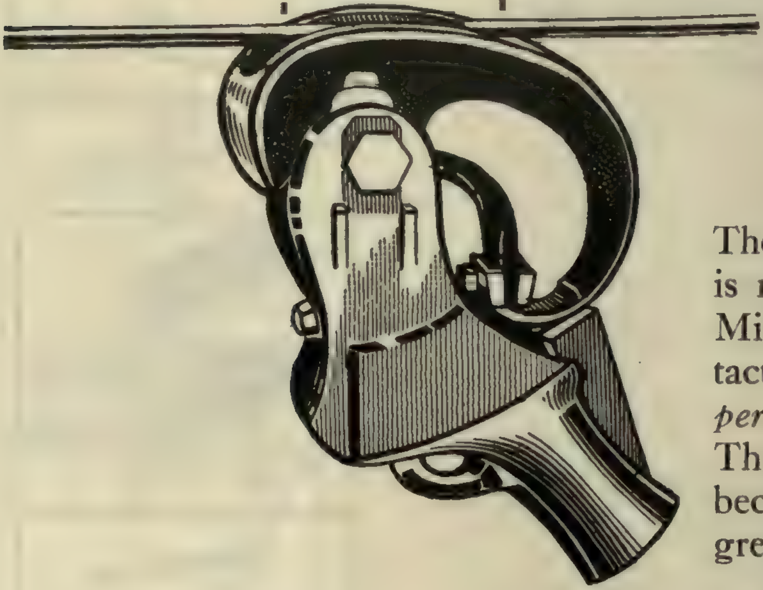
Boyerized Brake Hangers.

Boyerized Wearing Plates between the Bolster and Bolster Carrier.

Bemis Car Truck Company
Electric Railway Supplies
Springfield, Mass.

The ←3"→ Contact c

Eliminat



The wasteful pitting of trolley wir is no longer "a necessary evil." Th Miller Trolley Shoe with its 3-in. co tact doesn't jump and because of i *permanent* contact eliminates all arcin This means no pitting and less frictio because the tension is distributed over greater surface. Besides these features-

It will back up as easily as it will g forward

It eliminates noise

It needs no lubricants

It delivers more power to the motors

It gives greater mileage

It reduces maintenance cost

It is the standard on many roads

MILLER TROLLE

Columbia R

SPECIAL REPRESENTA

EASTERN REPRESENTATIVE: M

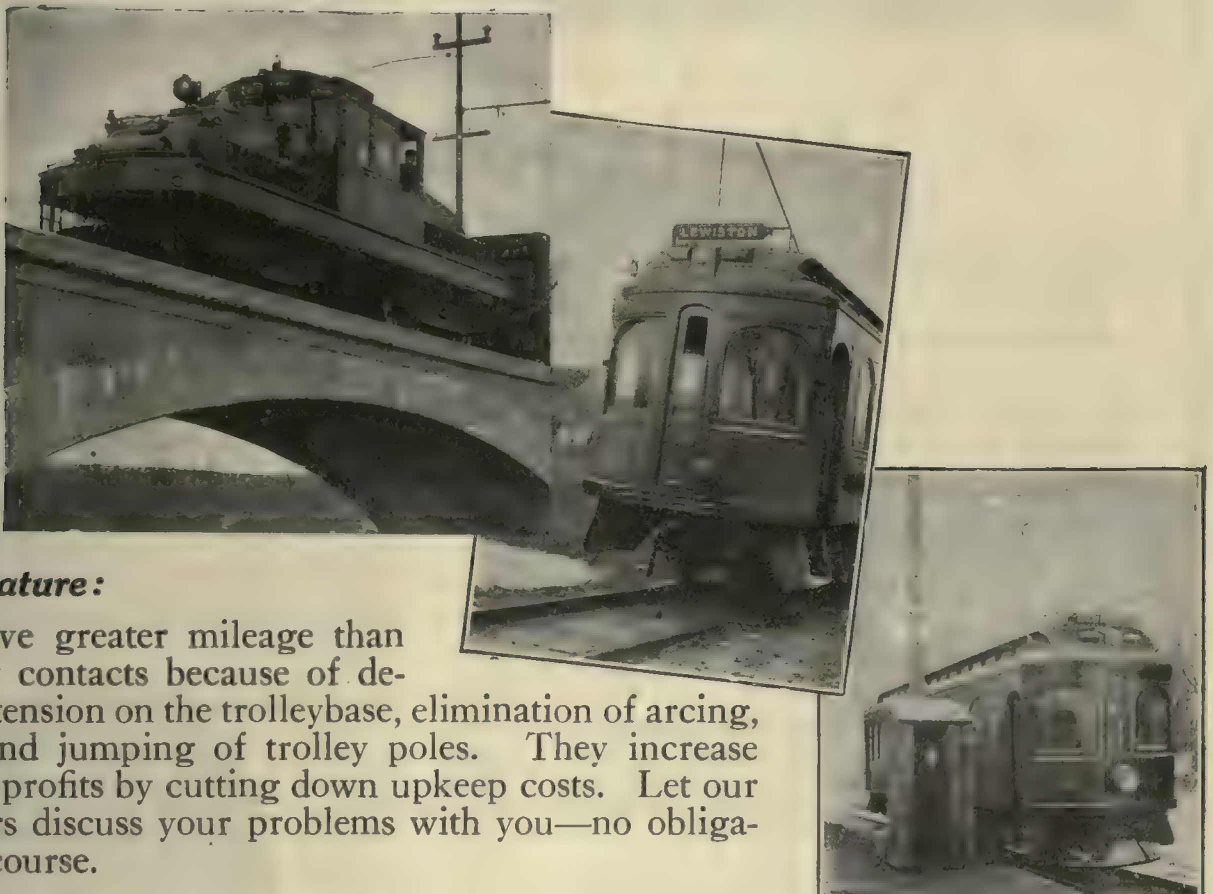
Alfred Connor
Denver, Colo.

T. C. White & Co.
St. Louis, Mo.

F. F. Bodler
San Francisco, Calif.

Miller Trolley Shoes

ne Sparking that Pits the Wire



This Feature:

They give greater mileage than ordinary contacts because of decreased tension on the trolleybase, elimination of arcing, oiling and jumping of trolley poles. They increase revenue profits by cutting down upkeep costs. Let our engineers discuss your problems with you—no obligation of course.

HOE COMPANY

orchester, Mass.

lden & White, Inc., Chicago

lway Appliance Co., New York

RESENTATIVES:

W. M. McClintock
St. Paul, Minn.

S. I. Wailes
Los Angeles, Calif.

W. F. McKenney
Portland, Oregon

Economy in Track Construction

Every railway operator wishes economy in track construction, but combined with it must be durability. For an economical, easy-riding and permanent track Carnegie Steel Company recommends its

Steel Cross Ties

laid on a concrete base. The track shown above is of this type. Once laid there will be no further interruptions to traffic due to repair work. The ties are there to stay—will outwear the rails and can be reused if desired in other track.

For the concrete base you will find Blast Furnace Slag a most excellent coarse aggregate. Porous and angular, slag provides a superior bond. The cement enters these pores and forms one solid homogeneous mass. Within easy haulage distance from blast furnaces slag is decidedly economical.

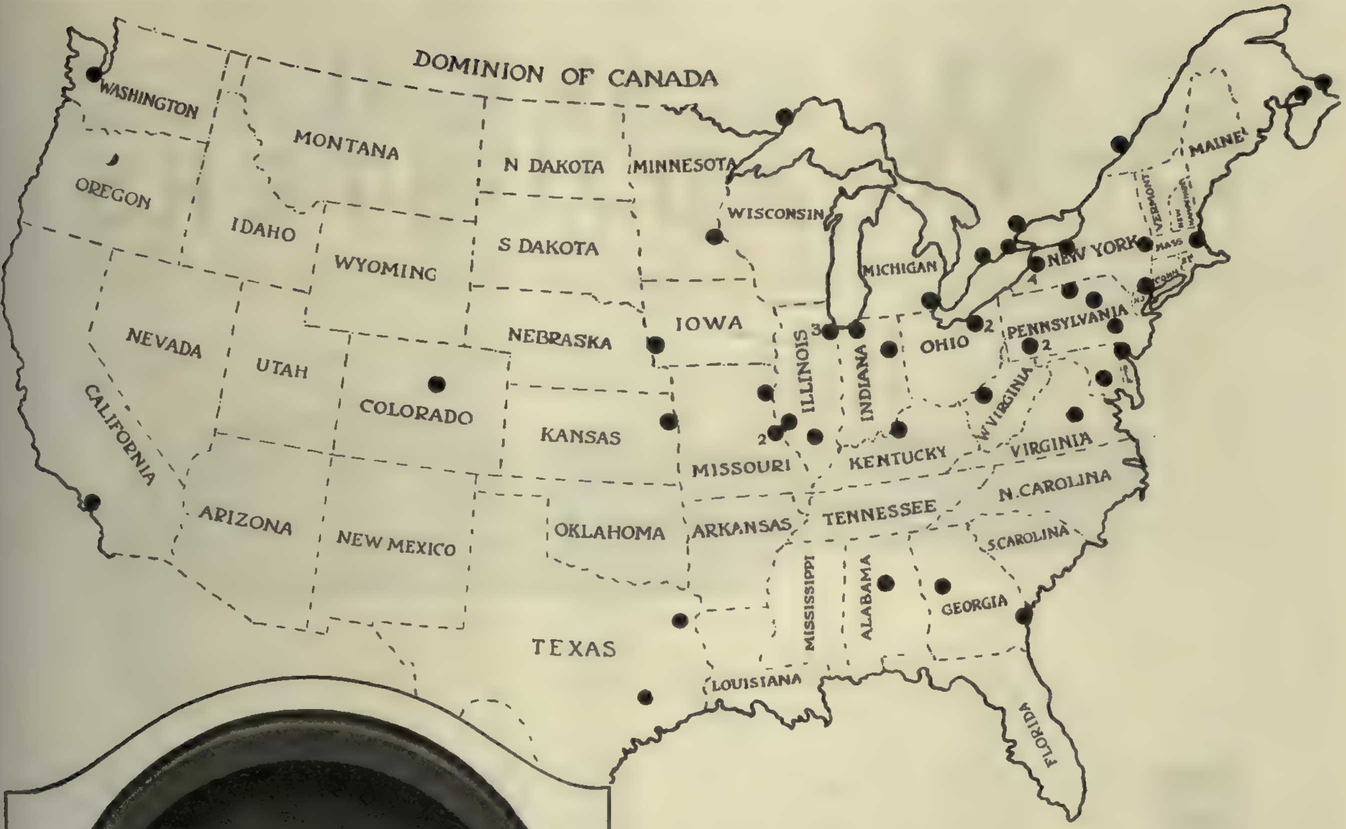
As to your gear and wheel requirements, Carnegie Steel Company is especially well equipped to supply your needs. Its solid wrought steel gear blanks and wheels are well known to railway officials as the most suitable for all classes of service. During the year 1920—not an unusually good year—this company sold enough wheels to electric and steam railroads, that, if they were placed side by side, would extend 68 miles—68 miles of satisfaction and good will.

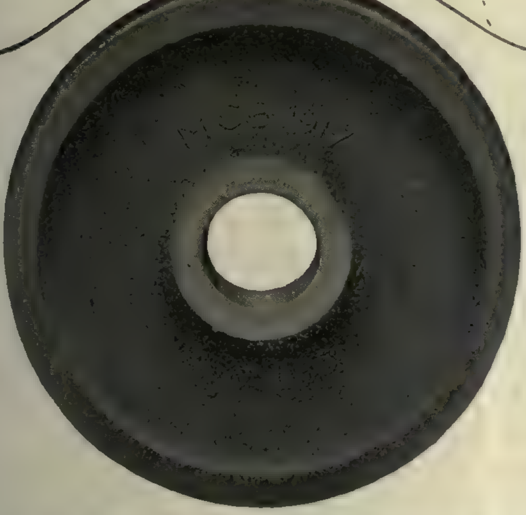
Carnegie Steel Company manufactures for railway use the most complete line of steel sections made in the United States. Many years of experience in serving railways has brought to our engineers a wealth of experience that is at your service. Be your problem track or rolling stock, take advantage of this service—they will gladly recommend the most suitable equipment for your needs.

Carnegie Steel Company

General Offices, Carnegie Building, Pittsburgh, Pa.

1423





49 *The map above shows the location of the 49 foundries in the United States and Canada, represented by the Association of Manufacturers of Chilled Car Wheels*

Chicago 3
St Louis 2
Buffalo 4
Pittsburg 2
Cleveland 2
Amherst N.S.
Montreal
Mich. City, Ind
Louisville
Mt Vernon, Ill
Ft. Wayne. Ind
Birmingham
Atlanta
Savannah

Boston
Detroit
St. Paul
Kansas City, Kan
Denver
Tacoma
Rochester, N.Y.
Sayre, Pa
Berwick. Pa.
Albany
Toronto
New Glasgow N.S
Madison, Ill.

Huntingdon W Va
Wilmington. Del
Houston, Tex
Hannibal Mo
Reading. Pa
Baltimore
Richmond. Va
Ft. William, Ont
St. Thomas, -
Hamilton,
Ramapo, N.Y.
Marshall, Tex
Los Angeles
Council Bluffs

AMERICAN RAILROAD ASSOCIATION STANDARDS

650 lb. wheel for 60,000 Capacity Cars
700 lb. wheel for 80,000 Capacity Cars
750 lb. wheel for 100,000 Capacity Cars
850 lb. wheel for 140,000 Capacity Cars

The Standard Wheel for Seventy Years

Where

CHILLED IRON WHEELS

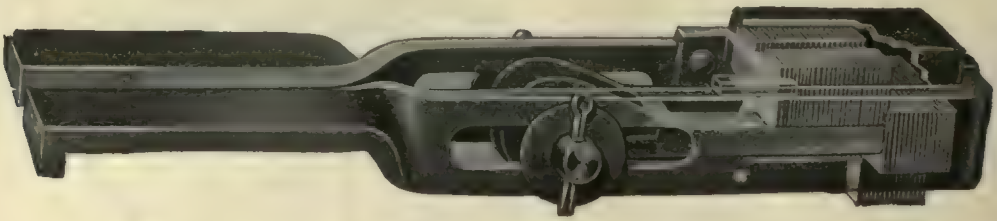
are made for Railway and Street Car Service

Capacity 20,000 per day
25,000,000 in Service

Association *of* Manufacturers *of* Chilled Car Wheels

1847 Mc Cormick Bldg.
CHICAGO

S-W BRAKE SLACK ADJUSTERS



SLACK in the brakes is one of the principal causes for Short Life of brake shoes. S-W Brake Slack adjusters take this up in such a manner that the brake shoe gets an evenly distributed wear at every point of contact. This gives them a longer life and at the same time decreases the chances for flat car wheels.

Install S-W adjusters and eliminate the necessity of frequent inspecting for brake slack. Repairs are reduced to a minimum—braking is unfailing. A safety car is not complete without the S-W brake slack adjuster.

Smith-Ward Brake Slack Adjusters automatically take up the slack in the line which comes from wear on the brake shoes. There is no other way to make braking dependable. The ordinary method of adjustment in the barn is unsafe — because the human factor enters. If the shoes are set wrong, the brake will not act with the speed the motorman has a right to expect.

S-W brake adjusters eliminate the hazard of braking. When your cars are S-W equipped there are no "ifs" about their operation. They are "safe" all the time. Hundreds of cars equipped with our adjusters prove the statement.

SMITH-WARD BRAKE COMPANY

233 37th Street, BROOKLYN, N. Y.

Kalamazoo

trolley wheels and harps

KALAMAZOO Equipment has fully demonstrated the economy of quality. Long life under the hardest of service, even with conditions of wear more severe than could possibly be anticipated, has been proved by 20 years of performance on leading roads.

Kalamazoo Harps give perfect and continuous contact, and are designed to permit easy replacement of wheels. There is only one cotter pin to be taken out to remove the wheel.

Kalamazoo wheels are made of virgin metal—pure lake copper—they are of proper design for the intended service, and are honestly manufactured.

They are balanced for easy running and freedom from slippage. They do not wear down and damage the wire, for wire life is more important than wheel life.

Catalogue is a valuable handbook.
Sent on request.

STAR BRASS WORKS

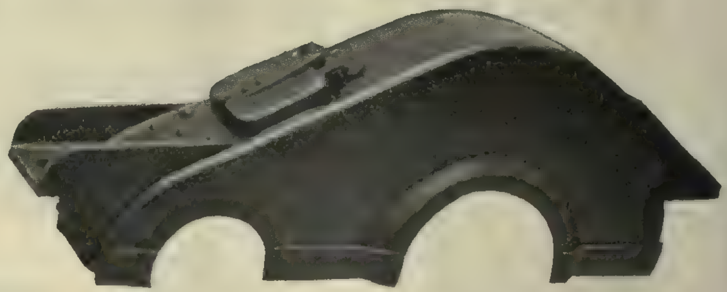
Kalamazoo, Michigan

The largest exclusive manufacturers of trolley wheels in the world

Chillingworth

One-Piece

Gear Cases



Chillingworth End Supported Gear Case

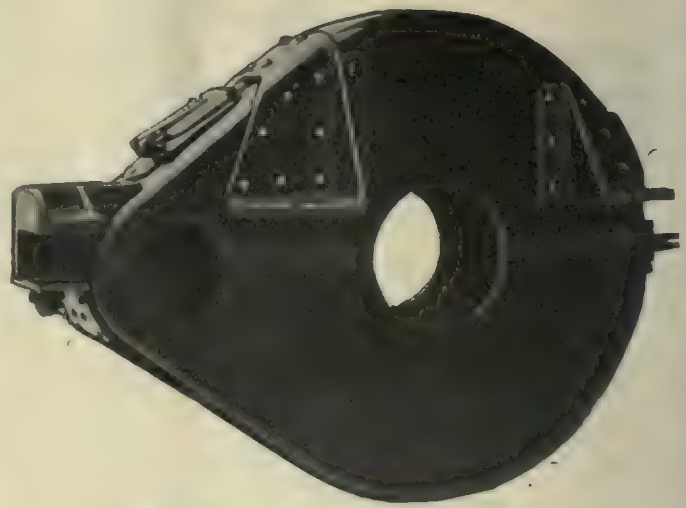
Chillingworth Gear Cases are made from deep drawn open hearth steel:

Seamless — Protecting your gears and pinions from water, mud or dirt, and preventing oil leakage.

Rivetless—Making them immune to loosening from vibration.

Light Weight—40% lighter than malleable iron cases and more durable, since on bad roadbeds, where a malleable iron case would smash, a Chillingworth merely dents.

Fitted with Chillingworth Malleable Iron Brackets that hold them securely to the motor frame. Especially designed to withstand vibration and ordinary rubbing over obstacles in the roadbed.



Chillingworth Side Supported Gear Case

Chillingworth Manufacturing Company
Jersey City, N. J.
Sales Department: Thayer and Company, Inc., 111 Broadway

ENGLAND SAYS

T. S. Q. means this

(Extract from a letter from one of our 74 customers in England)

> With reference to the copy of the letter from the General Manager of a Colonial Tramway System, giving his experience of the life of the Tool Steel Gears and Pinions, I think our experience has been quite equal and perhaps even a little better. We are perfectly satisfied with our results of the use of this gear.

"Tool Steel" Quality **T. S. Q.** "Tool Steel" Quality

The Tool Steel Gear & Pinion Co.
Cincinnati, Ohio

ROLLED STEEL WHEELS

TWO 12,000 ton hydraulic presses, rolls, and other modern equipment are used at the Cambria wheel plant in making the highest grade wheels that can be produced.

Our wheels give splendid service and satisfaction because:

(1) The steel is thoroughly worked and kept at the proper temperature throughout all forging and rolling operations.

(2) Wheels are sized in a solid die thus eliminating all eccentricity.

(3) The use of ignots with large radii at corners eliminates defects which ordinarily appear in the rolling operations.

Your inquiries are solicited.

MIDVALE STEEL AND ORDNANCE COMPANY CAMBRIA STEEL COMPANY

General Sales Office:
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DISTRICT SALES OFFICES:

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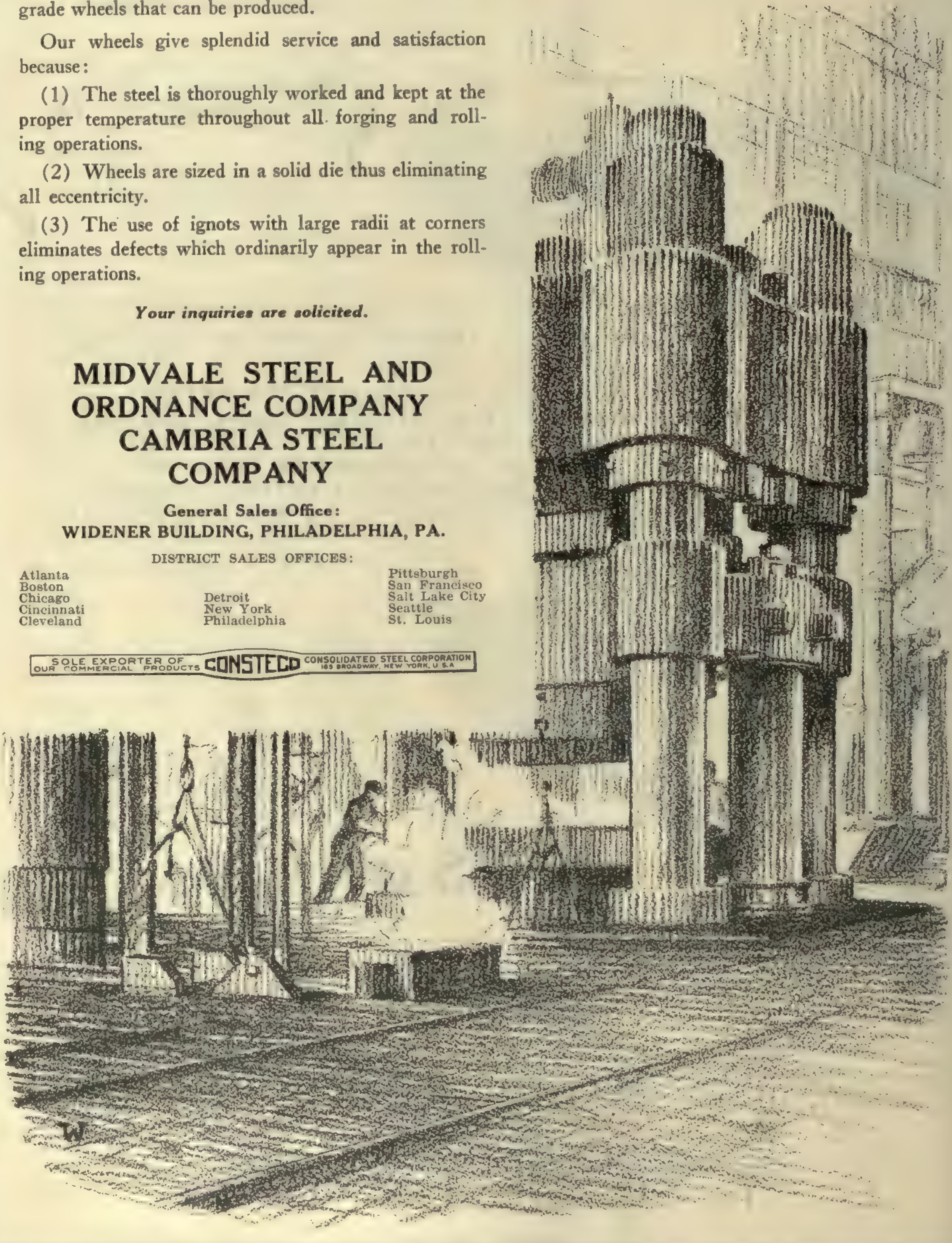
Cincinnati
Cleveland
Detroit
New York
Philadelphia
Pittsburgh
San Francisco
Salt Lake City
Seattle
St. Louis

SOLE EXPORTER OF OUR COMMERCIAL PRODUCTS CONSTECO CONSOLIDATED STEEL CORPORATION 165 BROADWAY, NEW YORK, U. S. A.



"STANDARD"

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

O. H. Steel and Malleable Iron Castings

Solid Forged Geared Blanks

Steel Forgings Iron Forgings

Forged and Rolled Steel

Pipe Flanges

Ring Dies

Rings

Roll Shells Steel Springs

S BRAND *"The 'Standard' Brand on your material is an assurance of eventual economy."* S BRAND

STANDARD STEEL WORKS CO.

GENERAL OFFICES:

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HOUSTON

MONTEREY, MEX.
MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE

CHEATHAM

Here is what a Railway in the State of Washington has to say about the "CHEATHAM SWITCH" when used in connection with

SAFETY OR ONE-MAN CARS

> *"Replying to your letter of October 29th, wish to state that we are very much pleased with the CHEATHAM ELECTRIC SWITCHES recently installed. The switches have worked to our satisfaction and have contributed materially in the matter of keeping up schedules, particularly with the one-man cars."*

SWITCH

Write

Cheatham Electric Switching Device Co.
4780 Ashbottom Rd., Louisville, Ky.

White's Porcelain Trolley Hanger

is more easily installed and more satisfactory in service

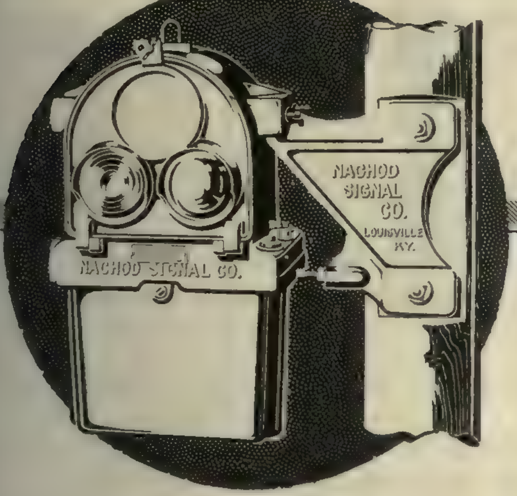
The insulator, stud and yoke are separable, yet they assemble as a unit. When the trolley ear is attached and screwed up firmly on the stud, it can be twisted around at right angles to the span wire without loosening the ear on the stud.

The head of the stud is countersunk into insulator so it can't turn after the ear is set in proper alignment.

The insulator is made of durable glazed porcelain. The yoke is galvanized iron, the stud sherardized steel.

White's Porcelain Hanger is extremely durable, safe and low in cost and WE CAN SHIP AT ONCE.

T. C. WHITE ELECTRICAL SUPPLY CO.
1122 PINE STREET, ST. LOUIS, MO.



Do It Automatically

So profound are the benefits of automatic operation of the many things about us daily that we cease to regard these benefits at all until we have to do these tediously by hand. For signaling your single track forget the old and unsafe "hand lights"—It is human nature to omit unnecessary (?) work and your motormen may leave them unset at the critical time. They do not protect following movements, they lose time and spoil your safety car service, and most of them can be tampered with. Instead of these install

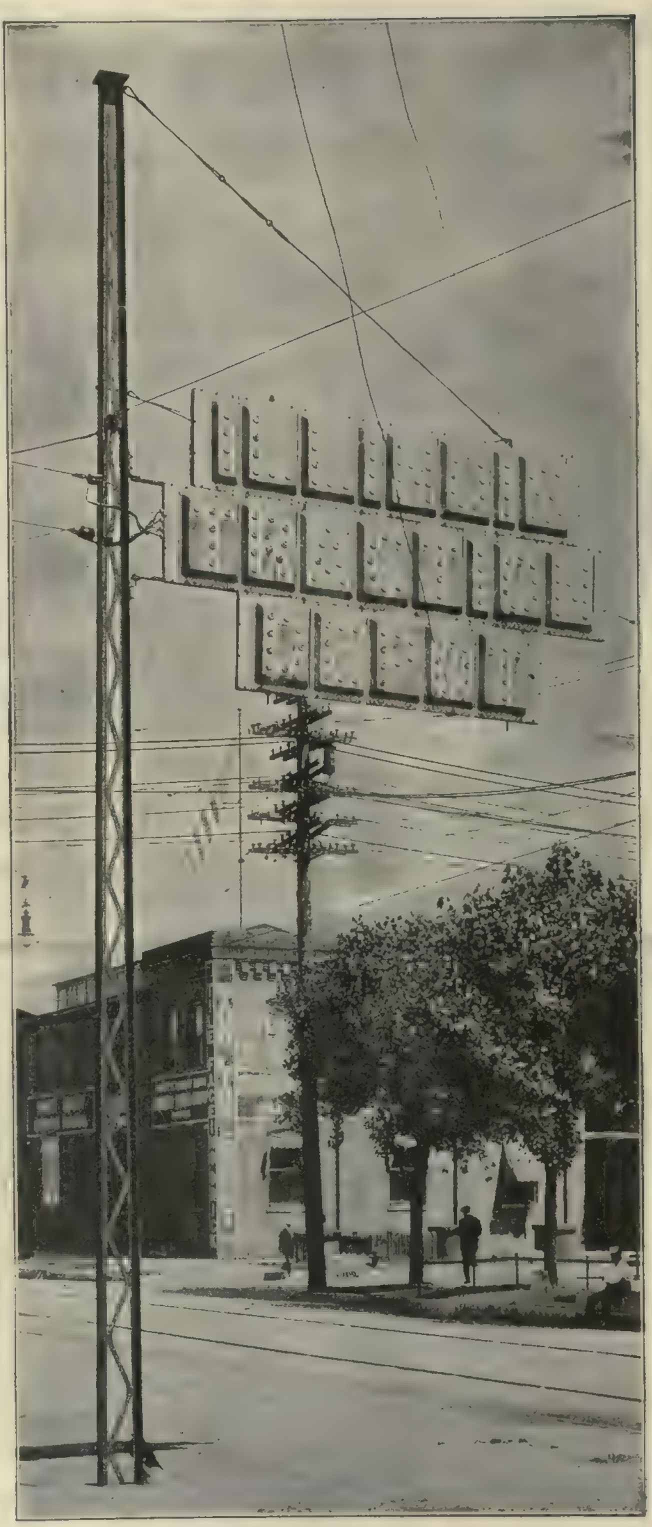
NACHOD SIGNALS

The motorman cannot forget, for they are automatically operated by the moving car itself. The insistent red eye brings him to his senses. Nachod Signals permit several cars as desired to follow thru the same block but prevent an opposing movement until every car has passed out of the block. They allow every safe car movement, including those for shifting, and they get the maximum traffic out of your single track.

If your road is not receiving the benefits of Nachod Automatic Signals learn the good things about them from our Catalog 719.

Nachod Signal Co., Inc., Louisville, Ky. Manufacturers of Automatic Signals, Highway Crossing Bells and Automatic Headway Recorders.

NACHOD SPELLS SAFETY



Bates One-piece Poles Are Artistic

Perhaps Art is a secondary consideration when you plan your pole line construction, but it cannot be disregarded—especially when these poles are to be installed in exclusive residential districts or on your business blocks.

The combination of great utility and art with the lowest first cost makes the Bates Poles desirable for all types of pole line construction.

Our New 1921 TREATISE AND HANDBOOK sent upon request.

Bates Expanded Steel Truss Co.

208 South La Salle Street
CHICAGO, ILLINOIS

"Six Years with Satisfaction"

"Wish to advise that we have used these arresters on our telephone lines for the past six years with very good success. Not only do they give entire satisfaction in keeping the lines well drained but also leave the telephone lines 'clear' after lightning storms or high tension disturbances."

Regardless of what any manufacturer claims for his apparatus, the unbiased opinion of the user is what counts.

Join the army of satisfied users by installing Primo Giant Vac-M Lightning Arresters and prevent high tension disturbances from interfering with electric train dispatching.

The National Electric Specialty Co.

Terminal Bldg., Toledo, Ohio

Special Standard Bronze (S. S. B.) High Strength Trolley Wire

meets every demand made upon it in any service requiring durability, dependability and economy under most severe operating conditions. Rigid service tests by unbiased engineers under such conditions have demonstrated the superior strength, rust-and-wear-resistance of S. S. B. wire over hard drawn copper and steel wires. Among other "high strength trolley wires" it has no superior.

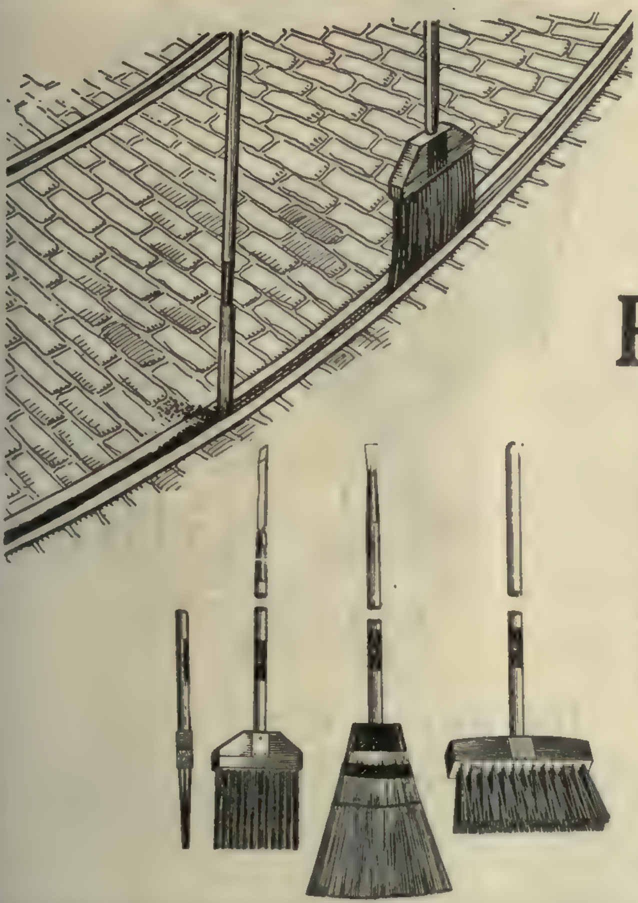
We invite comparisons and will appreciate an opportunity to send samples. Write our nearest office.

Standard Underground Cable Co.

Pittsburgh, Pa.

Boston
New York
Philadelphia
Washington
Atlanta
Pittsburgh
Detroit
Chicago
Seattle
St. Louis
Salt Lake City
Los Angeles
San Francisco
Minneapolis

For Canada: Standard Underground Cable Co., of Canada, Limited, Hamilton, Ont.



Keep Traffic Running Smoothly with

Paxson Brooms

Do mud, dirt, ice or minor obstructions tie up traffic on your lines? A slight obstruction in the groove of the track frequently causes expensive tie-ups.

Distribute Paxson Brooms over your lines. That is the inexpensive way to keep traffic running without interruption.

No. 1. Flat Wire to sweep crossings.

No. 2. Bamboo for switches, frogs, etc., to remove snow and light dirt with or without chisel.

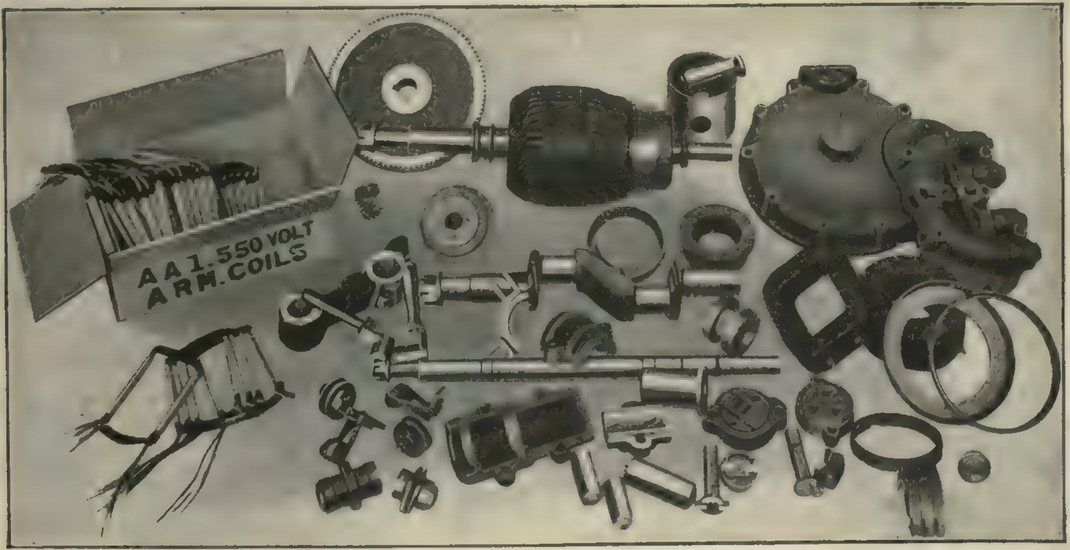
No. 3. Flat Wire for slush, mud and dirt, in curves and switches with or without chisel.

The chisel on end of handle for ice or other obstructions: also to throw switches.

Send for details

J. W. PAXSON CO.

1021 N. Delaware Ave., Philadelphia, Pa.



AIR BRAKE REPAIR PARTS

for all Christensen and Allis-Chalmers Equipments

These parts are accurate—interchangeable and made of the very best materials. They can usually be shipped immediately as an adequate stock is carried at all times.

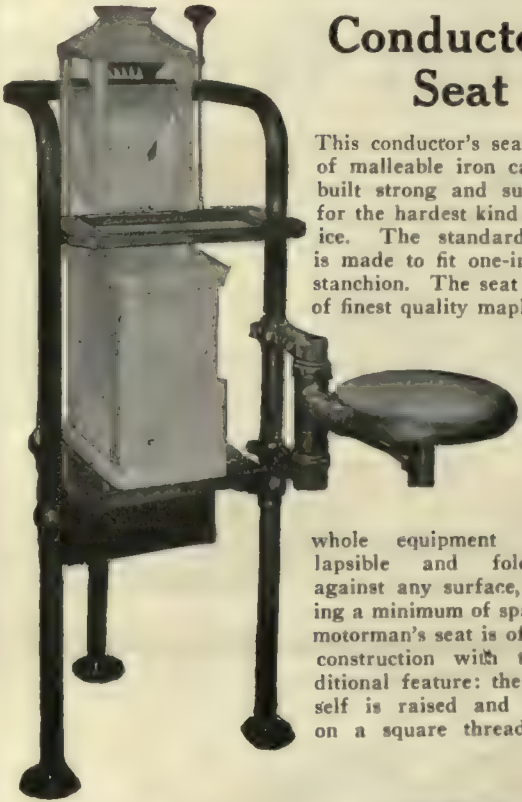
Ask for our Repair Part Contract

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

This equipment will reduce your maintenance costs

Conductor's Seat



This conductor's seat is made of malleable iron castings—built strong and substantial for the hardest kind of service. The standard design is made to fit one-inch pipe stanchion. The seat is made of finest quality maple. The whole equipment is collapsible and folds flat against any surface, occupying a minimum of space. The motorman's seat is of similar construction with this additional feature: the seat itself is raised and lowered on a square thread screw.

Trolley Harp

This is our No. 4 Trolley Harp fitted with a No. 4 U-Grooved Wheel. It is especially designed and built for the heaviest kind of service. The strong, substantial construction makes it the ideal current collector for interurban service.

Write today for complete data on the Advance line of quality equipment which includes Conductor and Motorman's Seats, Trolley Wheels and Harps, Sleet Cutters, Window Catches, etc.

Advance Manufacturing & Tool Co.
Cleveland, Ohio

H & K No. 108-A.V.
For Safety Cars

There's a Hale & Kilburn SEAT for every kind of service

The most economical seat on the market

Minimum Weight
Maximum Strength
Surpassing Durability
Neat Trim Design

"Walkover" Seat Mechanism Requires Least Maintenance

Seats for Safety Cars
Seats for City Traffic
Seats for Suburban Cars
Seats for Subway Cars

Hale & Kilburn
Corporation

American Motor
Body Co.
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Factory and General Offices:

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New York Chicago
St. Louis Washington
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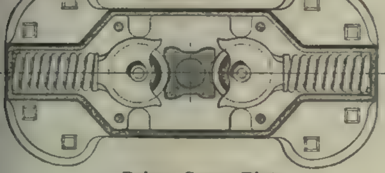
H & K No. 300 A
For City and Interurban Cars.

Ramapo

STYLE 17

RAMAPO
Automatic
Safety
Switch Stand

A Sectional View of
Automatic Safety Switch Stand
STYLE 17



Below Cover Plate
Showing Automatic Mechanism

Automatic Switch Stands

in

Medium Heights

and

Dwarf Styles

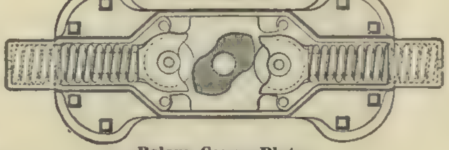
TEE RAIL
SPECIAL WORK
for Interurban Lines and
Private Right of Ways

Manganese
Street and Steam Crossings
a Specialty

STYLE 37

RAMAPO
Automatic
Return
Switch Stand

A Sectional View
Automatic Return Switch Stand
STYLE 37



Below Cover Plate
Showing Mechanism
Half Thrown Automatically

RAMAPO IRON WORKS

HILLBURN · NEW YORK

Plants at Hillburn, N.Y. *and* Niagara Falls, N.Y. *New York Office* 30 Church St.

Speed Up Repairs

with the

Comstock Coil Winding Machine

Easily done with the Comstock because this adjustable head winding machine has three speeds, is driven through a cone friction clutch and worm gear, and is controlled with a foot lever. Winds either left or right hand and is equipped with a four wheel Veeder counter.

Save Time and Labor with Comstock Armature Coil Press

This adjustable armature coil press is used either for hot or cold pressing, using gas or steam when hot pressing is desired.

Coils are pressed with one movement of the cam lever and any amount of pressure can be had by adjusting nuts on hook bolts. Platens are adjustable to suit any coil up to ⅞ in. square. Extra platens are used only when different lengths of coils are to be pressed. Just the machine for your shop.

Write for bulletin and prices.

The Comstock Manufacturing Co.
319 Horton Street, Wilkes-Barre, Pa.

WHY "UNION" RENEWABLE FUSES *Don't Get Hot*

Heat is caused by resistance. Consequently the more metal there is to carry the current in a fuse, the less resistance—less heat—there will be.

Compare the weight of the metal in a "Union" Renewable Fuse with others. You will find *more* solid brass in *one* of the caps of a "Union" Renewable Fuse than there is on both caps of some fuses.

Brass costs real money these days. And we could save a great deal of money by skimping on the weight of our metal parts. But that is not the "Union" way of building fuses. Every part of "Union" Fuses is of the most rugged construction.

They are built to give *perfect* service and *long* service.

"Union" Fuses, both Renewable and Non-Renewable, are for sale by all leading electrical jobbers and dealers.

They are approved in the very highest degree by the National Board of Fire Underwriters.

The "Union" saves more than ANY other renewable fuse.

Free descriptive booklet sent on request.

"UNION"
RENEWABLE
UND. LAB. INSP.
600 AMP.
600 VOLTS
CHICAGO FUSE MFG. CO.

Chicago Fuse Mfg. Co.

Oldest and largest manufacturers of Fuses, Electrical Protecting Materials and Conduit Fittings.

Chicago New York

THE U-RE-LITE

A modern Circuit Breaker to meet modern conditions. An I-T-E Circuit Breaker in a steel box: so much better than a fused switch that it is in a class by itself.

It opens instantly on the occurrence of a short circuit or a predetermined overload and can be as instantly reset, but it cannot be closed if the overload continues on the line.

IT DOES AWAY WITH THE CONSTANT EXPENSE AND THE DAMNABLE ANNOYANCE DUE TO THE USE OF FUSES, FOR THE CRY "FUSE BLOWN" MEANS IDLE MEN. It greatly diminishes the possibility of fire from electrical causes and affords positive protection to employees as well as to light or power circuits.

Made in capacities of 60 amperes and under for D.C. circuits of 250 volts or less and A.C. circuits of 250 volts or less, single phase.

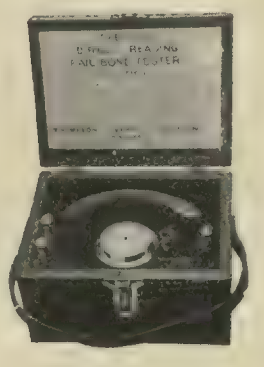
Each pole is closed by a slight turn of the handle, which is seen projecting above and below the tripping knob, by means of which the U-RE-LITE may be opened manually.

First to the left,
Then to the right,
Turn the handle
And U-RE-LITE.

LITERATURE UPON REQUEST

The Cutter Company
PHILADELPHIA

Insure against bond leakage



IT does not take much imagination to see the money running right out of leaking bonds and cross-overs on your lines. The very life blood of the system being needlessly wasted.

The Peerless Vawter Direct Reading Bond Tester will quickly and accurately locate these leaking bonds. Once located the leaks can be rapidly eliminated.

The best insurance you can get against leaking bonds is this Bond Tester that quickly locates them.

Shall we give you the details?

MADE AND SOLD BY

THOMPSON-LEVERING COMPANY

Electrical Measuring Instruments

PHILADELPHIA, PA., U. S. A.

Our Specialties:

- Testing Sets
- Wheatstone bridges
- Condensers
- Meter A. C. and D. C.
- Galvanometers
- Pyrometers
- Indicating Ohmmeters
- Photometers
- Tachometers
- Laboratory standards of precision

Awebco TRADE MARK

WEBBING
E B B I N
WEBBING

A Superior
Webbing
Enables you to get
Best Results and lowest
Cost on the Maintenance of your dynamos
Or Motors

Anchor Webbing Company

300 Brook St., Pawtucket, Rhode Island

Cut Your Maintenance Costs
By Using

Triggerlock Reversible Controller Fingers

Over 50% of the large traction systems of America have used them exclusively for years.

Our sales of Renewal Tips last year were three times as much as in 1919.

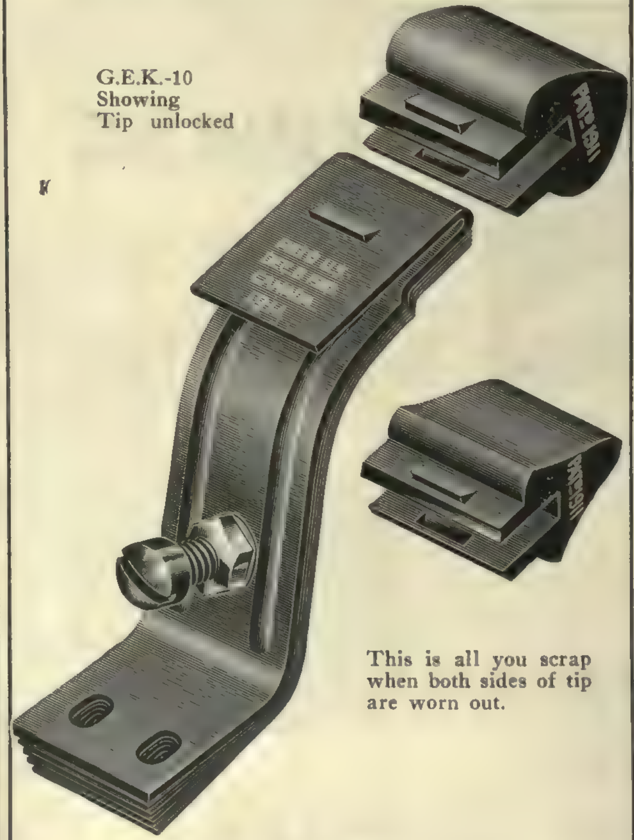
By renewing the tips after both sides have been worn down the cost of complete fingers is saved.

This with the time and labor required to attach and adjust new fingers is great economy.

The motormen like them, as the controller is easier to operate.

We have Triggerlock Fingers for all types of controllers, trucks, tractors, starters, compensators, etc.

Specify them on your next requisition



G.E.K.-10
Showing
Tip unlocked

This is all you scrap
when both sides of tip
are worn out.

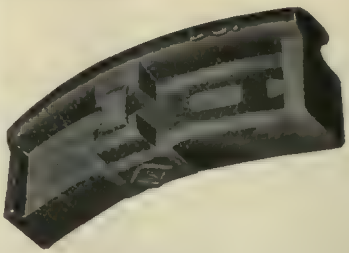
RUSSELL MFG. CO.

814-18 Bath Avenue, Niagara Falls, N. Y.
557 King Street, (West) Toronto, Canada

Brake Shoes

A. E. R. A. Standards

Diamond "S" Steel Back is the Best Type



Standard

Patterns

for

SAFETY
CAR

D-67 for Narrow Treads
D-87 for Wide Treads

American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago **Chattanooga, Tenn.**

They are uniform in quality

They talk for themselves

W. J. Jeandron
227 Fulton Street
New York City

Pittsburgh Office:
636 Wabash Building

Canadian Distributors:
Lyman Tube & Supply Co., Ltd.
Montreal and Toronto

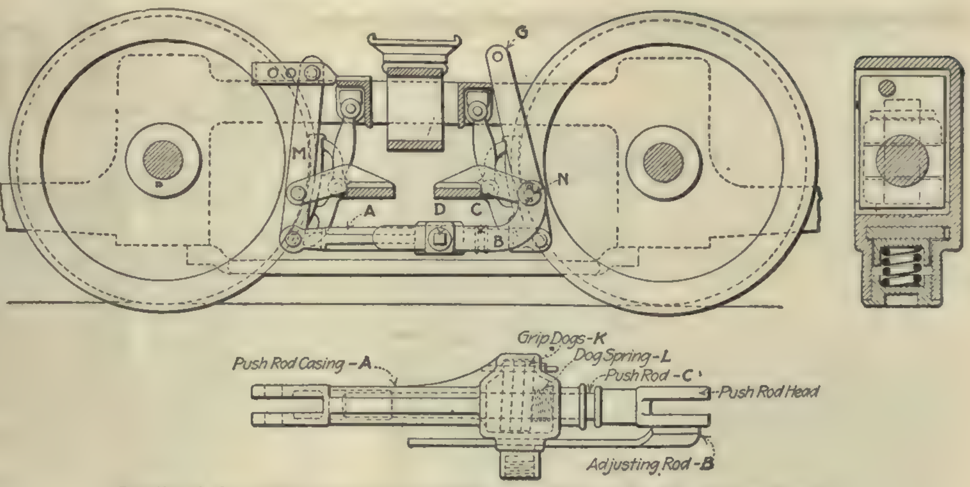
For increased safety
in operation—

ess wear on
rolling stock—

nd decreased
running time

GOULD

Automatic
Slack
Adjusters



Details of the Gould Type Slack Adjuster as applied to an Electric Car Truck

Brakes, to be effective, must always be in adjustment. But there has always been the difficulty of getting the proper attention paid to the work of manually adjusting the foundation brake rigging, while slack brake rigging is not always considered sufficient reason for sending a car over the inspection pits.

The Gould Universal Automatic Slack Adjuster overcomes just this objection. It is absolutely automatic in action, taking up all the false slack which may exist in one operation coincident with the application of brakes.

It operates with every application of brakes. It is capable of making the most minute adjustments. The result of its use is that the brakes are kept adjusted at all times—not simply for the first few days as after ordinary hand adjustment. The results are more mileage from your brake shoes, increased life of the entire brake system and decreased liability for breakages in any part.

Many railways have adopted the Gould Automatic Slack Adjuster as standard equipment. The Gould Universal Automatic Slack Adjuster is particularly adapted to the one-man safety car. Many installations on this type of car are now in operation, and orders for hundreds of Slack Adjusters have recently been received for one-man cars now being built.

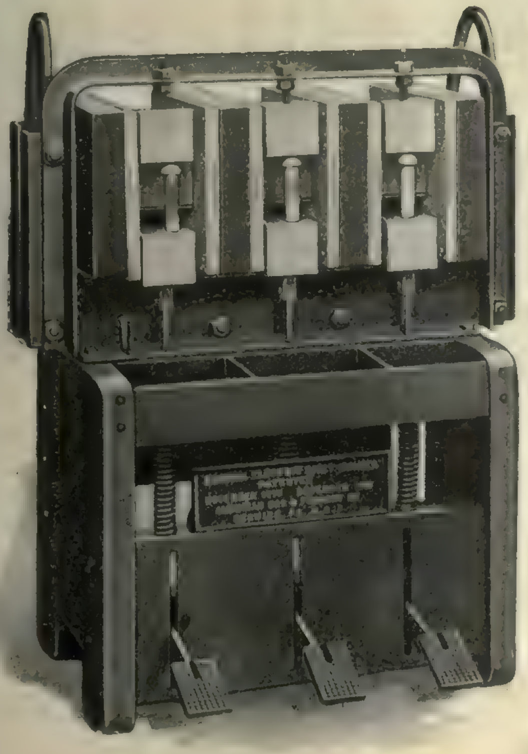
Write today for further information

0 East 42 St., New York City

GOULD COUPLER COMPANY
Works: Depew, N. Y.

The Rookery, Chicago, Ill.

PERFECTLY HEATED RIVETS



when and *where*
you want them

—that's what the Berwick Electric Rivet Heater provides. And at lower cost than fuel-burning heaters.

Some users report that they save $5 per day per heater. Others figure a saving of $1 per hundred pounds of rivets heated. In one of our own shops Berwick Heaters are saving $500 daily.

Besides, they are clean and smokeless; and the uniformity of temperature in Berwick-heated rivets makes for better workmanship and fewer chalk marks.

**American Car and
Foundry Company**
165 Broadway, New York
Chicago St. Louis

Cleveland Fare Boxes

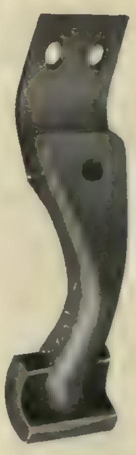
are widely specified as a basis of high standard, not only on account of their dependability but particularly on account of their adaptability to the varying needs of modern fare collection.

It is the Box that always fits the Fare and Fare Collection System.

The Cleveland Fare Box Company, Cleveland, Ohio
The Canadian Cleveland Fare Box Company, Preston, Ont.

EUREKA

Controller Fingers



will outlast the ordinary kind because they are made of hard drawn or drop forged copper. The springs are stamped from special alloyed rolled phosphor bronze sheet and the fingers are interchangeable with all standard controllers.

Eureka Trolley Wheels

are perfectly balanced, made of virgin metal and well finished. Correct design insures less wear on trolley wire and longer life of wheel.

Eureka Copper, Bronze and Steel Forgings

in special sizes and shapes are made to order. Eureka quality the best workmanship from the best materails, enters into every delivered product.

Write for catalog

The Eureka Co.
Northeast, Pa.
120 Broadway, New York

Maintenance

The only kind of maintenance your transportation buyers are interested in is *service maintenance.* Take care of that, and the other kind will take care of itself.

U. S. G. Brushes

on car motors and in power house units help maintain satisfactory service—AND lower the *maintenance cost* of the motors and other equipment. Journals and Gears serve better with Mexican Graphite Journal and Gear Grease. Trolley Wheels run better for an occasional application of Mexican Graphite Trolley Wheel Grease. Mexican Graphited Wood Grease also cuts costs.

Literature and detailed information on request.

U.S.G. Co's MEXICAN GRAPHITE PRODUCTS EST. 1891

The United States Graphite Co.
Saginaw, Michigan, U. S. A.
Branch Offices:
New York Philadelphia Pittsburgh Birmingham
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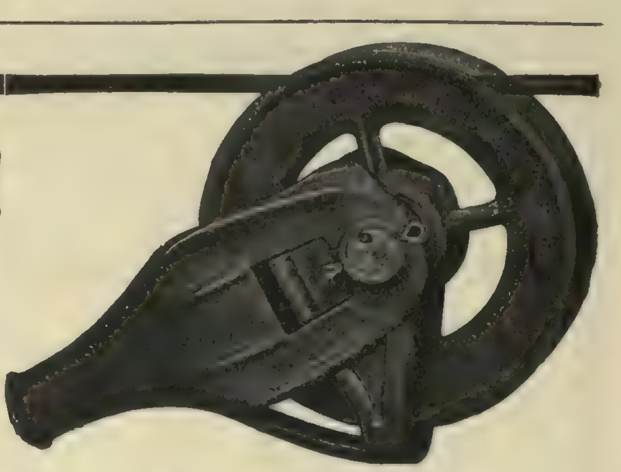
Largest Miners of Graphite on This Continent

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1921

Produced by the largest miners of Graphite in this Country



Right Off the Wire!

Purchasing agents and executives will be interested in our new plan of service. Hensley Guaranteed Trolley Wheels Make Good or they don't cost you a cent.

Write for details and revised prices

Hensley Trolley & Mfg. Co.
Detroit, Mich.

The
Mileage Armature Babbitt

Standard for Many Years

Guarantee

We guarantee the thorough satisfaction that can only be obtained from Babbitt made 100 per cent of Virgin Raw Materials consistently of the Highest Grades.

A trial is the most practical way of investigating the merits of any product. Give us the chance to show you.

E. L. Post & Co., Inc.

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The Better Kind

Brass and Bronze Castings

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Clark Electric & Mfg. Co.
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Trolley Catchers and Retrievers for Every Kind of a Car

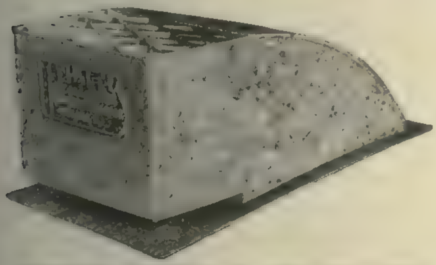
Safety cars, city cars, high-speed interurban cars, all require Earll Trolley Catchers or Retrievers.

We have specialized on Catchers and Retrievers, which means that you are getting the best that can be produced.

C. I. EARLL, York, Pa.

Note the Absence of Perforations

The mercury tube is mounted on springs and is not affected by vibration or jar of the car. The metal conductor around the mercury bulb makes contact on the outer case and transmits the temperature of the air on the outside of the case so readily to the mercury that we guarantee it to regulate within one degree.



Honeycomb Ventilator for Arch Roof Cars

Utility Indestructible Thermostats

Why you should not let another winter go by without installing UTILITY INDESTRUCTIBLE THERMOSTATS on your Electric-Heated Cars:

1. UTILITY INDESTRUCTIBLE THERMOSTATS save over 50 per cent in the consumption of current by the heaters.

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3. UTILITY INDESTRUCTIBLE THERMOSTATS reduce the cost of maintenance on your heaters, due to the fact that they prevent overheating of same.

4. UTILITY INDESTRUCTIBLE THERMOSTATS eliminate to a great extent the possibility of fires caused by the overheated heaters. Safety first.

5. UTILITY INDESTRUCTIBLE THERMOSTATS save what otherwise would be wasted current while cars are standing idle in car houses or around terminals with the trolley on and the heater switch cut in.

6. UTILITY INDESTRUCTIBLE THERMOSTATS give you the satisfaction of knowing that every car on your system is heated alike to a uniform temperature.

They are in use on almost 19,000 cars.

The 100% Efficient Utility Honeycomb Ventilator

The High Standard of Efficiency which we have always claimed for our Honeycomb Ventilators has been strongly substantiated in recent laboratory tests conducted at The Armour Institute of Technology, in which comparisons were made with many other well-known ventilators on the market.

Watch for the technical data of these tests, which will be published in the near future, or will be sent to anyone interested on request.

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Make the Little Ones Help to pay for the Big Ones

After the larger units are set up what becomes of the replaced small equipment?

Stored machinery occupies valuable space, unstored apparatus rusts out.

Why not advertise its sale in "SEARCHLIGHT" and have a large field of buyers from which to pick? Your appeal will then reach every mining camp. An Advertisement in "SEARCHLIGHT" helps to make your replaced smaller machinery pay for the larger installation.

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This 3-Section

TRENTON TOWER

is not only more convenient, but stronger than the older type.

The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

We'll gladly send you details.

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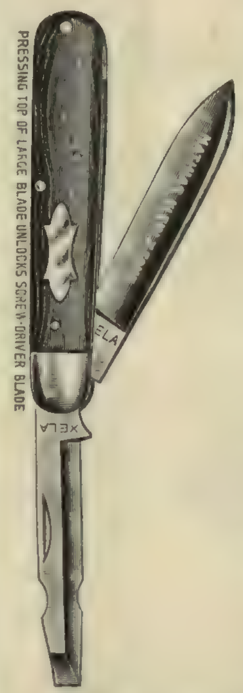
ELECTRICIANS' KNIFE


PRESSING TOP OF LARGE BLADE UNLOCKS SCREW-DRIVER BLADE
KELA
KELA

A handy combination for the electrician, combining an emergency screw driver, a knife blade for cutting or stripping wire; locked so that it cannot close during use. The commendable features are a well-tempered blade, a strong joint, a solid well-proportioned hand-fitting handle and a lock to keep the blade securely open, yet promptly releasable when it is desired to close the blades. Screw driver blade is locked when open; to unlock, press down on large blade.

Mathias Klein & Sons
Canal Station 25, Chicago

Peirce Forged Steel Pins
with Drawn Separable Thimbles
Your best insurance against insulator breakage
Hubbard & Company
PITTSBURGH, PA.

Transmission Line and Special Crossing Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
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For all Traction and Electric Transmission Purposes
Ask for "NATIONAL" Bulletin No. 14
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NEW YORK SALES OFFICE: 30 CHURCH STREET, NEW YORK CITY
COPPERWELD Wire—a non-corroding electrical conductor
8% Lighter—50% Stronger than Copper.

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Specialists
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Write for List
TIES—TIMBERS—POLES—PILING
DUNCAN LUMBER COMPANY, Portland, Oregon

TROLLEY POLES—

Massey hollow reinforced concrete trolley supports made by our centrifugal process are strong, permanent, neat and adaptable.

Eliminate maintenance by ordering poles that represent the most progressive development in this field. Massey poles never need painting or repairing—and are unaffected by weather conditions or vermin.

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Special Work for Street Railways

Frogs, Crossings, Switches and Mates
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Kerwin Portable Crossovers
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ESTIMATES PROMPTLY FURNISHED

Drip Points for Added Efficiency

They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000, Wet 31,400, Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

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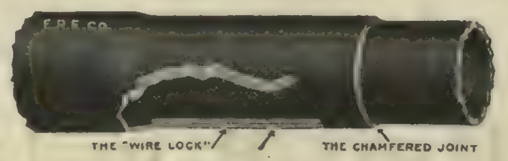

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Lowest Cost Lightest Weight
Least Maintenance Greatest Adaptability

Catalog complete with engineering data sent on request.

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HIGH-GRADE TRACK WORK

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
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Splice Bars and
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Track Bolts
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Send for booklets, "Lackawanna Deseamed Rails," "Improved Track Appliances," "Track Bolts and Spikes."

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Sole Exporter of Our Commercial Products, Consolidated Steel Corporation, 165 Broadway, New York
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Cross Ties
Railroad Lumber

IF you want—
WHAT you want
WHEN you want it

It will interest you to know that we can ship ties, treated or untreated, immediately from stock in our yards.

We carry all kinds and grades.

Bennett-Field Cross Tie Co.
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"The Shippin' Fools"

American
Rail Bonds

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*Send for new
Rail Bond book*

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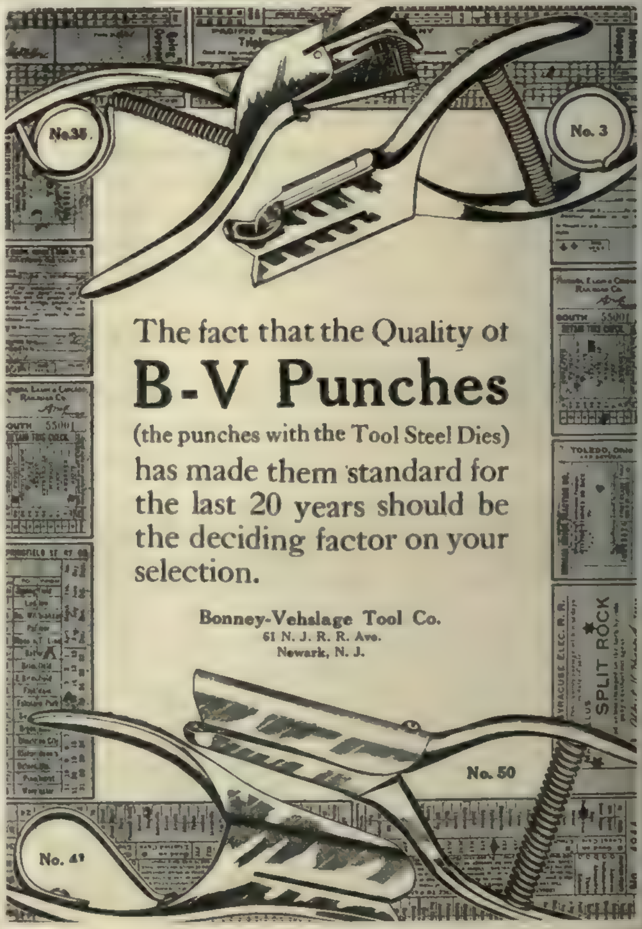

The fact that the Quality of
B-V Punches
(the punches with the Tool Steel Dies)
has made them standard for the last 20 years should be the deciding factor on your selection.

Bonney-Vehslage Tool Co.
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LaFrance Safety Devices for Every Industry

Give Your Workmen Protection Against Fumes and Gases By Providing LaFrance Respirators

Workmen should at all times be prepared against gases, fumes or dusts regardless of whether or not these fumes are poisonous, for even the non-poisonous ones weaken the breathing system and render it susceptible to disease.

The LaFrance line includes a mask or respirator for practically every known industrial gas or fume. When equipped with LaFrance breathing protection workmen can proceed about their duties unhampered by even the most trying breathing conditions. Invaluable for use while cleaning transformers.

Respirator No. 1300

Paper filter type for dusts and light fumes. The adjustable rubber air cushion enables it to fit tightly against the face without undue pressure.

These respirators are efficient, comfortable, sanitary and durable.

Write for our complete Safety Devices catalogue which gives complete first aid charts, and illustrates the entire line of LaFrance Safety Devices.

AMERICAN-LAFRANCE FIRE ENGINE COMPANY, INC.

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Workmen—

You can't
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Ask for our new Wrench Book

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STEAM SUPERHEATERS

Were introduced commercially in the United States by this Company. Owners of boilers it has built—Babcock & Wilcox, Stirling and Rust—not now equipped with these coal-saving accessories can obtain information about superheating possibilities from the nearest office listed below.

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TUCSON, ARIZ., 21 So. Stone Avenue
NEW ORLEANS, 533 Baronne Street
DENVER, 435 Seventeenth Street
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FOSTER SUPERHEATERS

A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits

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WE-FU-GO AND SCAIFE
WATER
PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES
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The fields of usefulness for Bakelite-Dilecto are many and varied because of its superior merit over materials heretofore available in sheets, tubes or rods. The exceptional qualities of Bakelite-Dilecto are satisfying electric railways all over the country. Investigate.

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ELECTRIC RAILWAY EQUIPMENT

for all classes of service

City and Interurban Cars and Trucks,
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Improve their appearance and better their service with American Brand Punches, Buttons and Badges.

Fifty years of experience in the railway field has enabled us to produce products whose quality is unsurpassed.

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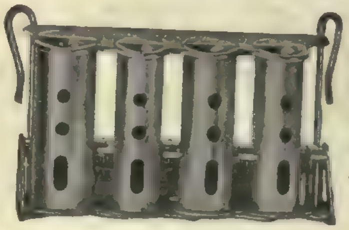

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The new 1921 model —without rivets— ready for delivery

Supplied in one or four tube combinations

Essential wherever the rapid and accurate handling of change is required. Now included in the standard equipment of largest Traction Companies because conductors demand them. Prices and literature sent on request.

J. L. GALEF, 75 Chambers St., New York City
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BUCKEYE JACKS

high-grade R. R. Track and Car Jacks

The Buckeye Jack Mfg. Co.
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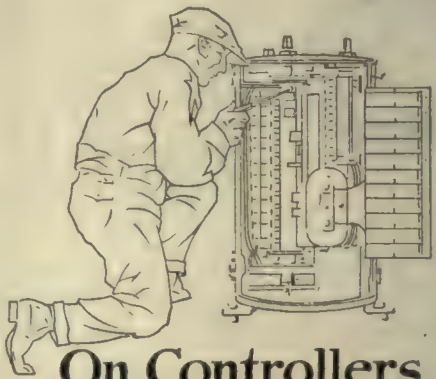
Compare Them

The faint light of a candle and the strong rays of a searchlight. They represent the comparative efficiency of other ways of finding what you want and advertising for it in the

SEARCHLIGHT SECTION

Employment Equipment Business Opportunities

613



On Controllers

ON Armatures, Commutator Heads, Switches, Circuit Breakers, Tape and for other protective insulating purposes, Don-O-Lac Special Insulator with its recent record of Di-Electric resistance, (i. e., 3500 Volts vs. 2300 Volts shown by pure Shellac) is not sold on a price comparison basis although it is $2.50 per gallon in 5 gallon lots.

Don-O-Lac insulates better. That's the statement we want you to qualify. We want you to experience the satisfaction of other roads now using it.

THE DON-O-LAC CO. INC.
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DON-O-LAC
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DON-O-LAC MEANS QUALITY

ROLLWAY BEARINGS

For Journals and Motors of all types of railway cars. Particularly adapted to safety cars. Have been in satisfactory service for ten years.

They are oil and dust proof.

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"American" Electric Railway Automatic Signals.
RECLAIMING MACHINES } for recovering
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SHERWIN-WILLIAMS
STREET RAILWAY
PAINTS and VARNISHES

Specialists in Insulating Varnishes

Consult Railway Sales Dept. for Special Service

THE SHERWIN-WILLIAMS CO.

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Factories, Sales Offices and Warehouses in all principal cities

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For High-Speed Cars

The Trolley Supply Company, Massillon, Ohio

STUCKI SIDE BEARINGS

A. STUCKI CO.
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Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost.

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H & W Electric Heaters
Garland Ventilators
Pitt Sanders
National Safety Car Equipment Co's One-Man Safety Cars

ELECTRIC RAILWAY JOURNAL

Think "SEARCHLIGHT" First

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ADD 5 WORDS for box number in undisplayed ads if replies are to any of our offices. There is no extra charge for forwarding replies.

DISCOUNT OF 10% if one payment is made in advance for 4 consecutive insertions of undisplayed ad.

ADS IN DISPLAY TYPE—Space is sold by the inch (30 in. to a page), the price depending upon total space used within a year, some space to be used each issue.

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POSITIONS VACANT

EMPLOYMENT

POSITIONS WANTED

POSITIONS VACANT

CLAIM investigator and adjuster for small but growing public utility company in one of the large lake cities. State experience and salary expected. P-856, Elec. Ry. Journal, Leader-News Bldg., Cleveland.

POSITIONS WANTED

AUDITOR, ten years' experience in street and interurban railway accounting familiar with interstate and state commission systems of accounts, desires change April 15th. Best references. PW-855, Elec. Ry. Journal.

ELECTRICAL engineer with eight years' railway experience; three on power and substation equipment; three as master mechanic and two as general superintendent, seeks position, preferably as superintendent of small road. Aged 30; can supply the very best of references. Available immediately. PW-858, Elec. Ry. Journal.

EXPERIENCED outside construction man desires position in way of electric railway, lighting, underground and submarine cables. Most experience in city of 200,000 population. Can produce results. PW-828, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

MASTER mechanic open for position, 18 years' experience in all departments, M. K. and H. L. control, can handle labor. A1 reference furnished. PW-859, Elec. Ry. Journal, Leader-News Bldg., Cleveland.

ROAD master now employed, wants change. 20 years on trolley roads. Can handle any track proposition. Reference very best. Seven years in one of largest cities in this country. PW-862, Elec. Ry. Journal.

SUPERINTENDENT—Street railway construction, rehabilitation, special work installation, welding, grinding, paving; long experience; speedy; economic; reliable. Member Society Civil Engineers. PW-861, Elec. Ry. Journal.

YOUNG man, experienced as inspector, dispatcher, time tables and chief clerk in transportation department, now employed, desires change with chances for advancement. Prefer Middle West or South. PW-845, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

In Replying to "Blind" Ads

be careful to put on envelope the key number in the ad and also local address of office to which reply is sent.

10th Ave. at 36th St., New York.
935 Real Estate Trust Bldg., Phila.
533 Leader-News Bldg., Cleveland.
1570 Old Colony Bldg., Chicago.
531 Rialto Bldg., San Francisco.

Important

Original letters of recommendation or other papers of value should not be enclosed to unknown correspondents — send copies.

0195

BUSINESS OPPORTUNITY

Attention Manufacturers Electric Railway Supplies

If you are short of funds, desire to sell or combine. The advertiser has unlimited capital, adequate plant facilities, and established trade with all electric railways. Desires to expand his lines. Ground floor. 50-50 propositions only will be considered. BO-863, Elec. Ry. Journal, Leader-News Bldg., Cleveland.

FOR SALE

Shares For Sale

10 shares Co-operative Society of America, $350; 10 Elgin Motor Co., $70. Phone, Englewood 187, L. J. Mather, 6807 Union Ave., Chicago, Ill.

Railway Motors

Standardize your Equipments at Minimum Cost

TRANSIT EQUIPMENT CO.
501 Fifth Avenue, New York

WANTED

10—71 TOOTH SPLIT OR SOLID GEARS

TRANSIT EQUIPMENT COMPANY
501 Fifth Avenue, N. Y.

WANTED

Prices on 2—B. & W. Water Tube Boilers 520 Horse Power, 18 Tubes wide, 14 Tubes high, 200 lb. pressure, or Edgemoor Boilers about 510 Horse Power, 17 Tubes wide, 15 Tubes high, both with 125 degree Superheaters and Underfeed Stokers. All of above must be in first-class condition.

Lexington Utilities Co.
Lexington, Kentucky

RAILS—CARS

Track Construction and Maintenance Equipment, Motors, Engines, Machine Tools, etc.

ZELNICKER IN ST. LOUIS

Send for YOUR copy new bulletin 290

WANTED

ROTARY CONVERTER

1—150 kw., for Electric Railway, complete with transformers to change 2300—60 cycle, 3 ph., A.C. to 575 D.C.

SUSQUEHANNA TRACTION CO.
Lock Haven, Pa.

WANTED

1—150 Kw. Rotary Converter complete with transformers and switchboard for use on 2300 volt, 60 cycle, 3 phase current. Also on street railway work at about 550 volts, D. C. State price.

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Eight G. E.

DYNAMOTORS

first-class condition. Car type 1200-600 V. 15 Amps

Charleston Interurban Railroad Co.
Charleston, W. Va.

Get your Wants into the Searchlight

0205

NEW—80-LB. RAIL and ACCESSORIES

Angle Bars, Spikes, Bolts and Nuts Complete

FOR SALE

A.R.A. "TYPE B" RAIL

Approximately 30,000 gross tons—standard lengths

Stored at Kearney, New Jersey

We buy electric and steam railways that are to be dismantled

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1312 First National Bank Bldg.

St. Louis Office:
2115 Railway Exchange Bldg.

Service Value

Scrap value for idle used machinery or surplus material is not enough. If it can be used by others they will pay *service value* for it. "Searchlight" will find these buyers for you.

Manufacturers who accept used machinery in part payment for new can dispose of it promptly by advertising in the Searchlight Section.

Machinery used in manufacturing and displaced by other equipment can be sold at a fair price by advertising it in the Searchlight Section.

Wide-awake dealers, agents or representatives can be secured through little Searchlight "Want" ads.

Manufacturing sites, partners, help, capital—anything that anybody in the machinery field is likely to have for sale or exchange for something else—can be located or disposed of through the Searchlight Section.

The cost of putting your Wants in this projector is very slight, whether for a man, for a job or for a market.

Searchlight Section

EVERYTHING FOR TRACK

New and Relaying Rail

FITTINGS AND TOOLS

TRACK SPECIALTIES CO.
29 Broadway, New York City.

New—Used—Rebuilt

MACHINERY AND SUPPLIES
for construction and industrial work

READING ENGINEERING CO., INC.
154 Nassau St., New York

For 20 Years

we have been
Buying and Selling

Second-Hand Cars

Trucks and Motors

At Your Service

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

FOR SALE

New Copper Wire

Surplus stock approximately 16,000 lbs. No. 6--7/061 stranded medium hard drawn bare copper cable on original reels about 1,200 lbs. each at attractive price; all or any part.

JACKSON P. DICK, P. A.

Georgia Railway & Power Co.
Atlanta, Ga.

MAKE US A PRICE

On 70 Stationary Screens for Intake

Size 6 ft. 8 in. x 6 ft. 9 in. High
Frame 6 in. channel
Mesh ½ in. No. 10 galvanized
also
4 screens
Sizes 6 ft. 8 in. x 3 ft. 6 in. High

These screens are well made and are ready for immediate delivery from our West End Station, Cincinnati, Ohio.

The Union Gas & Electric Co.
Cincinnati

NEW
REBUILT

ELECTRIC MOTORS

REWINDING
REPAIRING

NEW A.C. MOTORS ¼ to 15 H.P.—LARGE STOCK USED MOTORS
EXCELLENT REPAIR SERVICE ON ANY SIZE OR TYPE

CLEVELAND ARMATURE WORKS, INC.

EST. 1895 4732-4-6 ST. CLAIR AVE., CLEVELAND O. *INC. 1918*

The Searchlight Advertising in This Paper

is read by men whose success depends upon thorough knowledge of means to an end—whether it be the securing of a good second-hand piece of apparatus at a moderate price, or an expert employee.

The Best Proof

of this is the variety of this journal's Searchlight ads. Without a constant and appreciable demand for such machinery or services, by its readers, the market-place which these advertisements represent could not exist for any length of time.

Are you using the Searchlight Section?

010

Machinery in Stock

for

Immediate Shipment

ROTARY CONVERTERS

1—500 kw. Westg. 6 ph., 25 cy., 440 v., A.C.; 600 v. D.C., 500 r.p.m.
1—500 kw. G. E. 600 v. D.C., 3 ph. 60 cy.
2—200 kw. G. E. 25 cy. 370 v. A.C., 600 v. D.C., 750 r.p.m.
1—150 kw. Westg. 3 ph. 60 cy. 370 v. A.C., 575 v. D.C., 720 r.p.m.
2—150 kw. G. E. 25 cy., 370 v. A.C.; 600 v. D.C., 750 r.p.m.

FREQUENCY CHANGER SETS

1—500 kw. G. E. 3 ph., 60 cy., 2300 v., 750 r.p.m. generator dir. ctd. to 700 hp., 3 ph., 25 cy., 13200 v., 750 r.p.m. motor.
1—500 kw. G. E. 3 ph. 60 cy. 2300 v. 300 r.p.m. generator dir. ctd. to 800 hp. 3 ph. 25 cy. 2300 v. 300 r.p.m. motor.

ARCHER & BALDWIN, Inc.
114-118 Liberty St., New York City
Tel.: 4337-8 Rector

Some One Wants to Buy

the equipment or machinery that you are not now using.

This may be occupying valuable space, collecting dust, rust and hard knocks in your shops and yards.

Sell it *Before* depreciation *Scraps* it.

0178

IF YOU CAN'T USE IT

Sell It

The equipment you do not need can usually render good service elsewhere. You can reach the largest group of buyers of such equipment at small cost through an ad in the

SEARCHLIGHT SECTION
For Every Business Want
"*Think* SEARCHLIGHT *First*"

0155

Have Faith in Your Industry!

WE see every reason to believe that the year will turn out to be a prosperous one. There is an undercurrent of optimism which cannot be mistaken. The railways are on the up grade and going strong.

In saying what we have we do not overlook the difficulties ahead, the problems to be solved. But difficulties and problems are always with us. Life would be monotonous if they were absent. It is merely that they are different ones in 1921 from those which have gone before and been long since overcome or solved successfully. * * *

As we have said before, we have faith in the men of the industry. To those who doubt we would say:

Have faith in the industry—or get out!

Excerpt from Annual Statistical Issue of ELECTRIC RAILWAY JOURNAL

ELECTRIC RAILWAY JOURNAL

Member Audit Bureau of Circulations
Members Associated Business Papers, Inc.

Tenth Ave. at 36th St., New York

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Aftercoolers
Chicago Pneumatic Tool Co.
Ingersoll-Rand Co.

Air Circuit Breakers
Condit Electrical Mfg. Co.

Air Receivers
Chicago Pneumatic Tool Co.
Ingersoll-Rand Co.
Western Elec. Co.

Anchors, Guy
Crouse-Hinds Co.
Electric Service Supplies Co.
Ohio Brass Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Angle Bars
Lackawanna Steel Co.

Automobiles and Buses
Brill Co., The J. G.

Axles
Cambria Steel Co.
Carnegie Steel Co.
Bemis Car Truck Co.
Midvale Steel & Ordnance Co.
St. Louis Car Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Standard Steel Works Co.
Westinghouse Elec. & Mfg. Co.

Babbitt Metal
Ajax Metal Co.
More-Jones Brass & Metal Co.

Babbitting Devices
Columbia M. W. & M. I. Co.
Western Elec. Co.

Badges and Buttons
American Railway Supply Co.
Electric Service Supplies Co.
International Register Co., The
Western Elec. Co.

Batteries, Dry
Nichols Lintern Co.
Western Elec. Co.

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Post & Co., Inc., E. L.
St. Louis Car Co.
Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bearings, Motor Axle
Clark Elec. & Mfg. Co.

Bearings, Roller and Ball
Railway Roller Bearing Co.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.
Western Elec. Co.

Benders, Rail
Niles-Bement-Pond Co.

Boilers
Babcock & Wilcox Co.

Boiler Tubes
National Tube Co.

Bond Testers
American Steel & Wire Co.
Rail Welding & Bonding Co.
Roller-Smith Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.
Rail Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse Elec. & Mfg. Co.

Book Publishers
McGraw Hill Book Co., Inc.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Bores—Junction and Outlet
National Metal Molding Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
Western Elec. Co.

Brake Adjusters
Gould Coupler Co.
National Ry. Appliance Co.
Smith-Ward Brake Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
Ackley Brake & Supply Co.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Traction Brake Co.
Western Elec. Co.

Bridges and Buildings
Amer. Bridge Co.

Brooms, Track, Steel or Rattan
Paxson Co., J. W.
Western Elec. Co.
Zelnicker, W. A., Supply Co., Inc.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Morganite Brush Co.
United States Graphite Co.
Westinghouse Elec. & Mfg. Co.

Brushes, Graphite
United States Graphite Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

Bunkers, Coal
Amer. Bridge Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., J. G.
National Metal Molding Co.

Bushings, Graphite and Wooden
Bound Brook Oilless Bearing Co.

Cables. (See Wires and Cables)

Cambric Tapes, Yellow and Black Varnished
Irvington Varnish & Insulator Co.

Cambric, Yellow and Black Varnished
Irvington Varnish & Insulator Co.

Carbon Brushes. (See Brushes, Carbon)

Car Heaters
Economy Electric Devices Co.

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
Midvale Steel & Ordnance Co.
National Ry. Appliance Co.
National Safety Car & Equipment Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
General Electric Co.

Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Clark Elec. & Mfg. Co.
Columbia M. W. & M. I. Co.
Eureka Co.

Castings, Gray Iron and Steel
American Bridge Co.
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Earll, Chas. I.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Ohio Brass Co.
Trolley Supply Co.
Wood Co., Chas. N.

Ceiling, Car
Pantasote Co.
Rail Welding & Bonding Co.

Change Carriers
Galef, J. L.

Checks, Employees
American Railway Supply Co.

Circuit Breakers
Cutter Elec. Mfg. Co.
General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Dossert & Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Hubbard & Co.
Klein & Sons, Mathias
Ohio Brass Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.

Cleats
National Metal Molding Co.
Western Elec. Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Comstock Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Comstock Mfg. Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & Mfg. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Coin-Counting Machines
Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.

Combustion Systems
Engineer Co.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Mica Insulator Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
Chicago Pneumatic Tool Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Trac. Brake Co.

Compressors, Gas
Ingersoll-Rand Co.

Concrete Products
Massey Concrete Products Co

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

Condensor Paper
Irvington Varnish & Insulator Co

Conduit Fittings
Chicago Fuse Mfg. Co.
Crouse-Hinds Co.

Conduits, Flexible
Tubular Woven Fabric Co.

Conduits, Interior
National Metal Molding Co.
Western Elec. Co.

Condulets or Conduit Fittings
Crouse-Hinds Co.

Connectors, Solderless
Dossert & Co.
Frankel Connector Co.
Westinghouse Elec. & Mfg. Co.

Controller Fingers
Russell Mfg. Co.

Controllers or Parts
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Conveying and Hoisting Machinery
American Bridge Co.
Columbia M. W. & M. I. Co.

Cooling Systems
Spray Engineering Co.

Copper Wire
Anaconda Copper Mining Co.
Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roebling's Sons Co., John A.
Samson Cordage Works
Silver Lake Co.
Trolley Supply Co.

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Gould Coupler Co.
Ohio Brass Co.
Westinghouse Trac. Brake Co.

Cranes
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.

Cross Arms. (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing Signals. (See Signals, Crossing)

Crossings, Frog & Switch
Wharton, Jr., & Co., Wm.

Crossings, Manganese
Indianapolis Switch & Frog Co.

Crossings, Track. (See Track, Special Work)

Culvert Pipe, Concrete
Massey Concrete Products Co.

Culverts
Armco Iron Culvert & Flume Mfgs.
Canton Culvert & Silo Co.

Highest Development in Insulators

Jeffery-Dewitt Insulators have reached the highest state of development in insulator construction—their satisfactory service at home and abroad under every operating condition bespeaks the attention of every engineer and executive interested in electrical power transmission.

The experience of the best engineering and manufacturing talent has combined to perfect insulators of unusual merit—the thick, cementless Jeffery-Dewitt disc type insulators.

Complete details of these sturdy insulators are gladly mailed on request. Every electric railway executive should have a copy of our catalog entitled "Rugged Insulators." Have you your copy?

JEFFERY-DEWITT INSULATOR CO.
Huntington, West Virginia

Boston, 176 Federal Street
Birmingham, Ala., Jefferson County Bank Bldg.
St. Louis, Mo., La Salle Bldg.

St. Paul, Pioneer Bldg.
Los Angeles, 330 Azusa Street
Detroit, Mich., Garfield Bldg.
Des Moines, Iowa, Hubbell Bldg.

Jeffery-Dewitt
INSULATORS

WHAT AND WHERE TO BUY

Curtain Materials (Vestibule)
Du Pont Fabrikoid
Du Pont de Nemours & Co., Inc., E. I.

Curtain Materials (Window)
Du Pont Fabrikoid
Du Pont de Nemours & Co., Inc., E. I.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Electric Service Supplies Co.
Pantosote Co.
St. Louis Car Co.

Cutouts
Chicago Fuse Mfg. Co.

Dealer's Machinery
Archer & Baldwin
Electric Equipment Co.
Foster Co., L. B.
Hyman Michaels Co.

Derailing Devices. (See also Track Work)
Cleveland Frog & Crossing Co.
Wharton, Jr. & Co., Wm.

Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Detective Service
Wish Service, P. Edward

Dogs, Lathe
Williams & Co., J. H.

Door Operating Devices
Consolidated Car Heating Co.
National Pneumatic Co., Inc.
Safety Car Devices Co.

Doors and Door Fixtures
Brill Co., The J. G.
Dahlstrom Metallic Door Co.
General Electric Co.
Hale & Kilburn Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc.

Draft Rigging. (See Couplers)

Drills, Rock
Chicago Pneumatic Tool Co.
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Chicago Pneumatic Tool Co.
Electric Service Supplies Co.
Niles-Bement-Pond Co.
Ohio Brass Co.

Dryers, Sand
Electric Service Supplies Co.
Zelnicker Supply Co., Inc. Walter A.

Electrically Operated Switches (Air or Oil)
Condit Electrical Mfg. Co.

Electrical Wires and Cables
Roebling's Sons Co., J. A.

Electric Rivet Heaters
Amer. Car & Fdry. Co.

Electric Tools
Chicago Pneumatic Tool Co.

Electrodes, Carbon
Indianapolis Switch & Frog Co.

Electrodes, Steel
Indianapolis Switch & Frog Co.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Clark Management Corp., E. W.
Day & Zimmermann, Inc.
Drum & Co., A. L.
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Horton Barker & Wheeler
Jackson, Walter.
Jacobs & Co., J. L.
Republic Engineers, Inc.
Richey, Albert S.
Sanderson & Porter
Stone & Webster
White Engineering Corp., The J.G.

Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Chicago Pneumatic Tool Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

Fare Boxes
Cleveland Fare Box Co.
Economy Electric Devices Co.
Johnson Fare Box Co.
Ohmer Fare Register Co.
National Railway Appliance Co.

Feed Water Heaters
Schutte & Koerting Co.

Fences, Woven Wire and Fence Posts
American Steel & Wire Co.
Western Elec. Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Star Brass Works

Fibre and Fibre Tubing
Continental Fibre Co.
Westinghouse Elec. & Mfg. Co.

Field Coils (See Coils).

Filters, Water
Scaife & Sons Co., Wm. B.

Fire Extinguishing Apparatus

Flaxlinum Insulation
National Railway Appliance Co.

Floodlights
Crouse-Hinds Co.
Electric Service Supplies Co.

Flooring Composition
American Mason Safety Tread Co.
Western Elec. Co.

Forgings
Carnegie Steel Co.
Columbia M. W. & M. I. Co.
Duff Mfg. Co.
Eureka Co.
Standard Steel Works Co.
Williams & Co., J. H.

Frogs, Track. (See Track Work)

Funnel Castings
Wharton, Jr., Inc., & Co., Wm.

Fuses and Fuse Boxes
Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.
Williams & Co., J. H.

Fuses, Refillable
Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.

Gages, Oil and Water
Ohio Brass Co.

Gaskets
Power Specialty Co.
Westinghouse Traction Brake Co.

Gas-Electric Cars
General Electric Co.

Gas Producers
Westinghouse Elec. & Mfg. Co.

Gates, Car
Brill Co., The J. G.

Gear Blanks
Carnegie Steel Co.
Standard Steel Works Co.

Gear Cases
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Thayer & Co.
Westinghouse Elec. & Mfg. Co.

Gears and Pinions
Ackley Brake & Supply Corp.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Goggles, Eye
Indianapolis Switch & Frog Co.

Gong (See Bells and Gongs)

Graphite
Morganite Brush Co.

Grates, Chain
Green Eng. Co.

Greases. (See Lubricants)

Grinders and Grinding Supplies
Chicago Pneumatic Tool Co.
Indianapolis Switch & Frog Co.
Metal & Thermit Corp.
Railway Track-work Co.
Western Elec. Co.

Grinding Blocks and Wheels
Railway Track-work Co.

Guards, Cattle
Amer. Bridge Co.

Guards, Trolley
Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley
Anderson Mfg. Co., A. & J. M.
Bayonet Trolley Harp Co.
Electric Service Supplies Co.
Hensley Trolley & Mfg. Co.
Nuttall Co., R. D.
Star Brass Works
Western Elec. Co.

Headlights
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.
Trolley Supply Co.

Headlining
Pantasote Co.

Heaters, Car (Electric)
Consolidated Car Heating Co.
Economy Electric Devices Co.
Gold Car Heating & Lighting Co.
National Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Cooper Heater Co.
Smith Heater Co., Peter

Heaters, Car (Stove)
Electric Service Supplies Co.
Smith Heater Co., Peter

Heaters, Electric Rivet
Amer. Car & Foundry Co.

Helmets, Welding
Indianapolis Switch & Frog Co.

Hoists and Lifts
Chicago Pneumatic Tool Co.
Columbia M. W. & M. I. Co.
Ford Chain Block Co.
Niles-Bement-Pond Co.
Toledo Bridge & Crane Co., The

Hose
Chicago Pneumatic Tool Co.
Ingersoll-Rand Co.

Hose, Bridges
Ohio Brass Co.

Houses, Station, Watchmen's, Concrete
Massey Concrete Products Corp.

Hydraulic Machinery
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.

Injectors
Schutte & Koerting Co.

Inspection
Electrical Testing Lab's.

Instruments, Measuring, Testing and Recording
Economy Electric Devices Co.
General Electric Co.
Roller-Smith Co.
Thompson-Levering Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Insulating Cloth, Paper and Tape
Anchor Webbing Co.
General Electric Co.
Hope Webbing Co.
Mica Insulator Co.
Sherwin-Williams Co.
Standard Underground Cable Co.
Westinghouse Elec. & Mfg. Co.

Insulating Material, China and Porcelain
Jeffrey DeWitt Insulator Co.

Insulating Varnishes
Irvington Varnish & Insulator Co.

Insulation. (See also Paints)
Anderson M. Co., A. & J. M.
Dolph Co., J. C.
Electric Ry. Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Insulators. (See also Line Material)
Anderson M. Co., A. & J. M.
Drew Electric & Mfg. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Hemingray Glass Co.
Ohio Brass Co.
Thomas & Sons Co., R.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Insulators, China, Porcelain and Composition
Jeffrey Dewitt Insulator Co.

Insulator Pins
Electric Service Supplies Co.
Hubbard & Co.

Jacks. (See also Cranes, Hoists and Lifts)
Buckeye Jack Mfg. Co.
Columbia M. W. & M. I. Co.
Duff Mfg. Co.

Joints, Rail
Carnegie Steel Co.
Rail Joint Co.
Zelnicker Supply Company, Inc., Walter A.

Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.
Railway Roller Bearing Co.

Junction Boxes
Standard Underground Cable Co.

Lamp Guards and Fixtures
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
National Electric Specialty Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Arc and Incandescent. (See also Headlights)
Anderson M. Co., A. & J. M.
General Electric Co.
National Electric Specialty Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Signal and Marker
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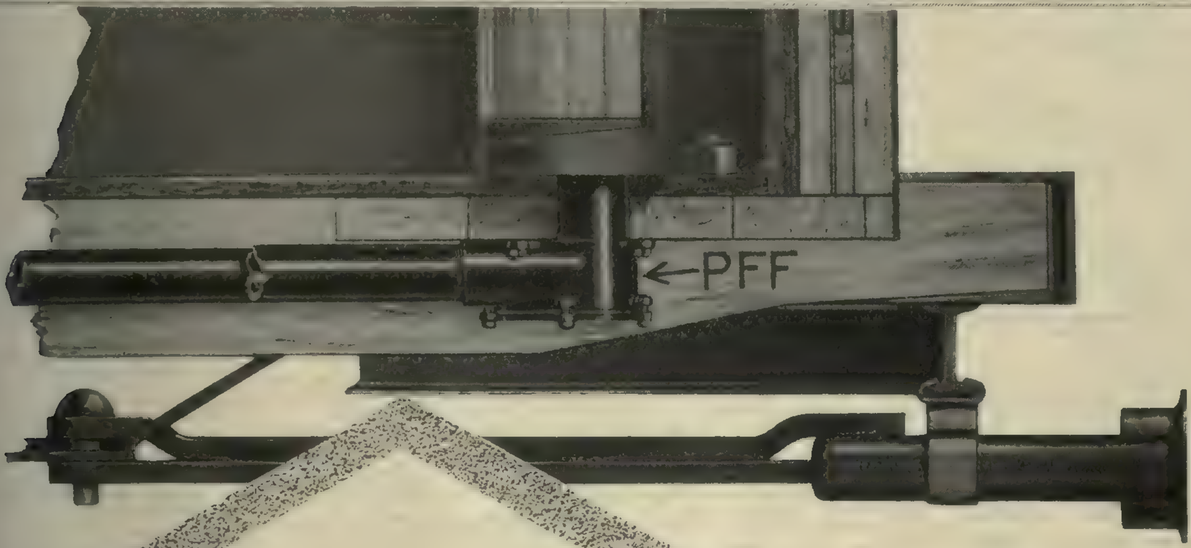

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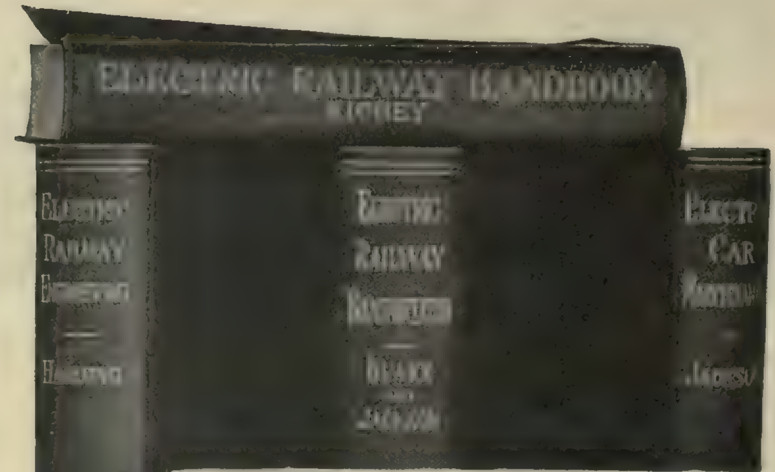
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Car Heating and Ventilation

is one of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company

1725 Mt. Elliott Ave., Detroit, Mich.

MASON SAFETY TREAD- Lead or carborundum filled non-slippery prevents accidents; cuts out damage suits

KARBOLITH CAR FLOORING--For steel cars, is sanitary, light weight, fire proof, non-slippery

STANWOOD STEPS--Self-cleaning, non-slippery, light

Over six million feet used without accident being reported within the knowledge of manufacturer. Our products used on all leading railroads on cars and stations. For details address.

AMERICAN MASON SAFETY TREAD CO., Lowell, Mass.
Branch Offices: Boston, New York City, Philadelphia
Agencies in all principal cities
Joseph T. Ryerson & Son, General Western Distributors

Collier Service

The Touchstone of the Industry

There are two media of information that make Collier Service the touchstone of the electric railway industry.

The human medium is furnished by the hundreds of Collier Service men throughout the land engaged in every activity from contract closing to car carding.

The mechanical medium is furnished by our perpetual record of facilities of the hundreds of Collier Service Railways.

And both media tell us that electric railway transportation is a live business, a growing business and a business worthy the continuance of our best efforts.

Barron G. Collier
INCORPORATED

Ten AGASOTE Advantage

Advantage No. Four

Needs No Auxiliary Coating

All you need do to an AGASOTE Car Roof is paint it—and you needn't even do that except for appearance sake. No Canvas Covering is necessary. An Agasote car roof will LAST without deterioration through all weather conditions. It holds paint as well or better than wood or steel. Its superiority has been proved on electric railway lines all over the country.

The Other 9

1. Has Great Strength.
2. Is Absolutely weather-proof.
3. Saves Labor.
4. Has high insulation value against temperature.
5. Makes a Cheaper Roof than Wood.
6. Is an Absolute Non-conductor of Current.
7. Is light in weight.
8. Holds Paint as well or Better Than Wood or Steel.
9. Saves Time.

We also manufacture Pantasote
the standard Car Curtain material

THE PANTASOTE COMPANY
11 Broadway, N. Y. **People's Gas Bldg., Chicago, Ill.**
751 Monadnock Bldg., San Francisco, Calif.

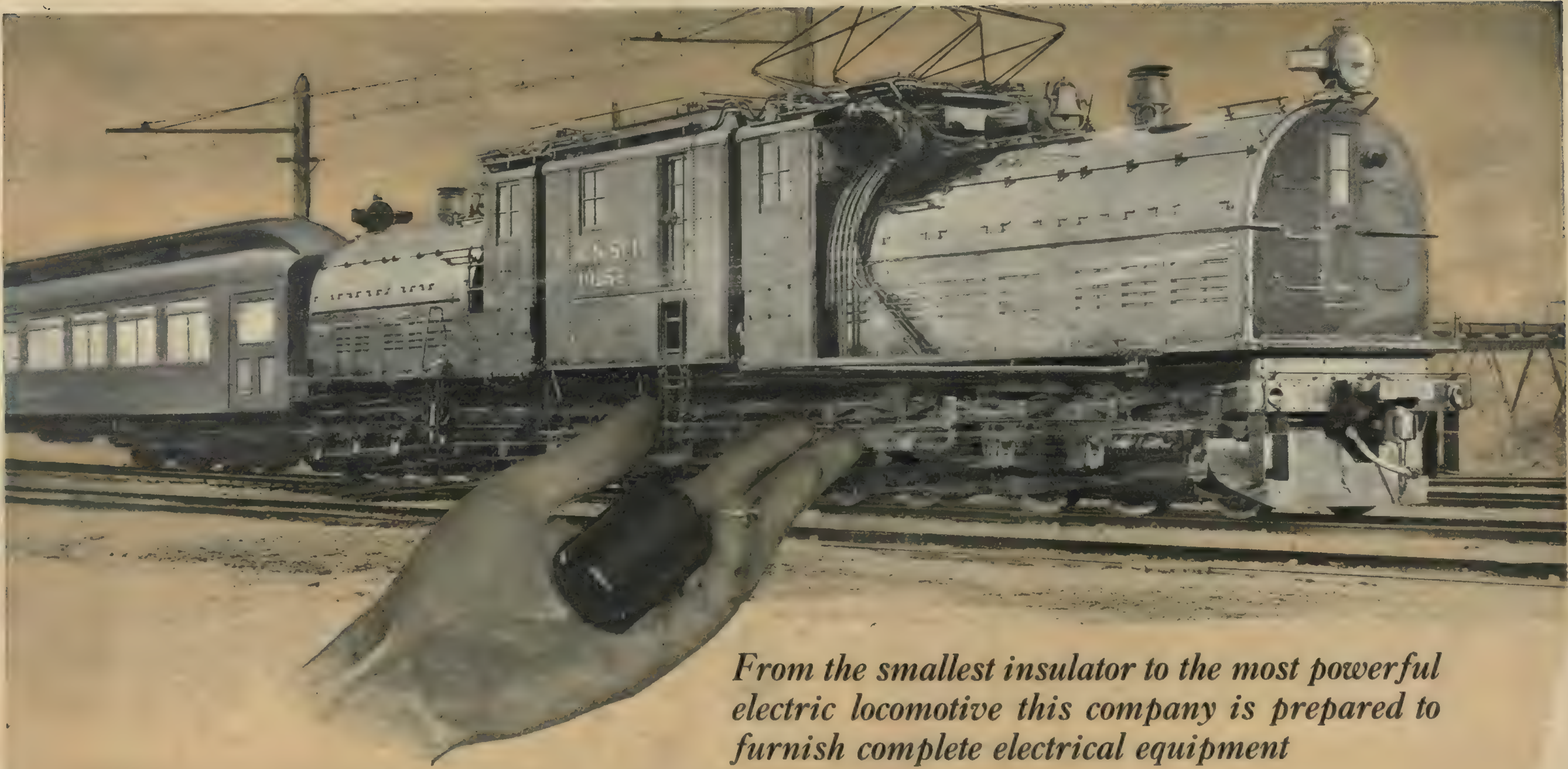
AGASOTE
TRADE MARK
ROOFING

Brake Pins and Bushings

All good brake pins and bushings are specially treated to develop those wearing qualities which are essential to long and satisfactory service. Reliability is of the greatest importance and that is what you can depend upon when you order Brill Case-Hardened Pins and Bushings. Minimum wear—economy—safety.

All standard sizes are carried in stock and are available for immediate shipment. Get our prices before placing your next order. Specify whether you prefer the round head pin or threaded turn-bolt pin.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WASON MANF'G CO.
ST. LOUIS MO. CLEVELAND, OHIO. SPRINGFIELD, MASS.



From the smallest insulator to the most powerful electric locomotive this company is prepared to furnish complete electrical equipment

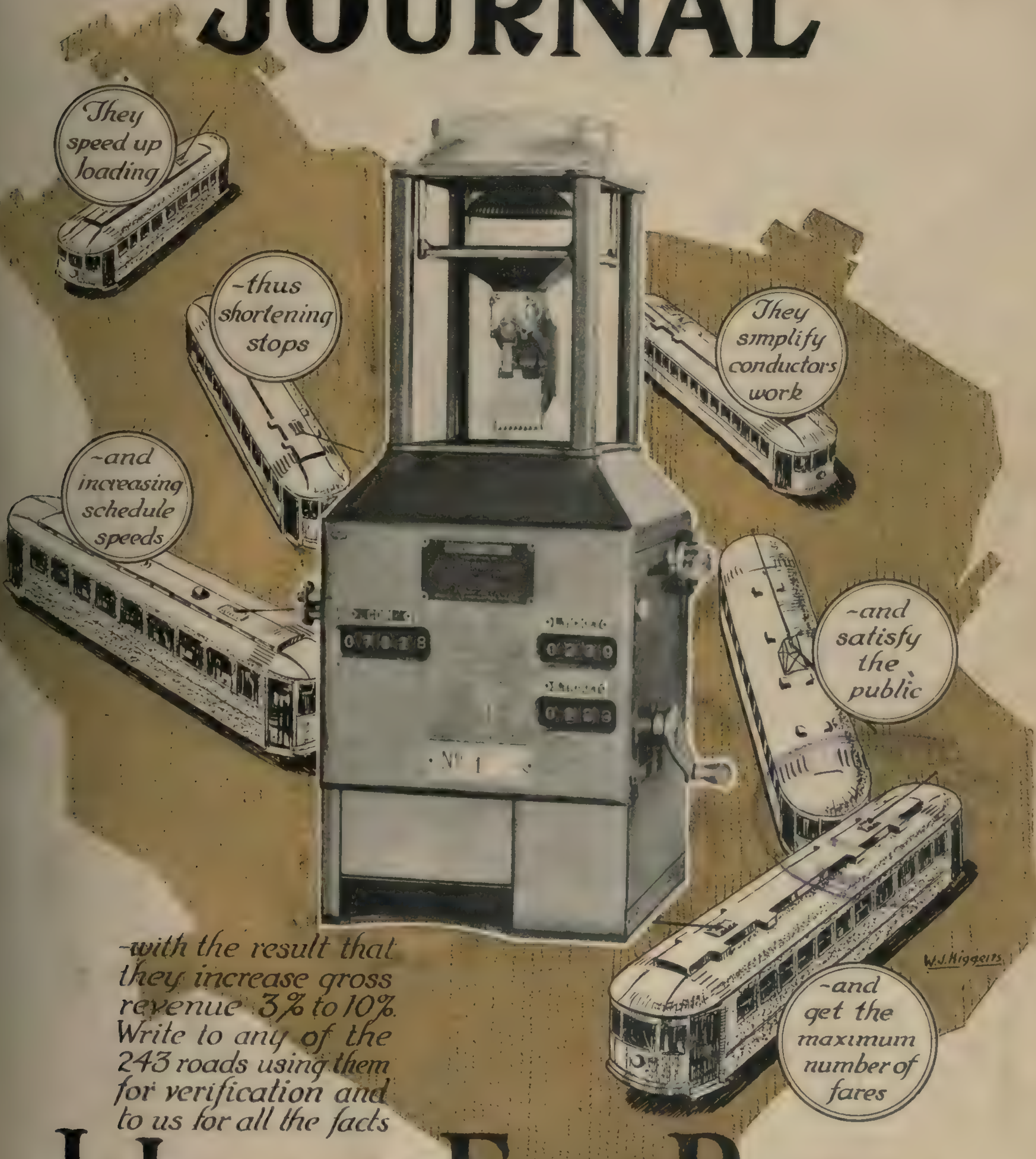
TODAY we are living in an age of electricity and our railroads now feel the thrill of this mighty power. Where steam once slowly puffed its way over mountain ranges the steady pull of the electric motor hauls longer trains at a greater speed. Electrification has increased the comfort and despatch of passenger travel. It has meant more ton-miles with less lost energy in the handling of freight. It is a natural product of the time.

The General Electric Company is ready to furnish every kind and variety of electrical equipment for the change from steam to electricity, be it a question of electrifying a tunnel, a terminal or hundreds of miles of main line. The part already played by the Company in great electrification projects the world over, is a guarantee of its ability to render beneficial service.

General Electric

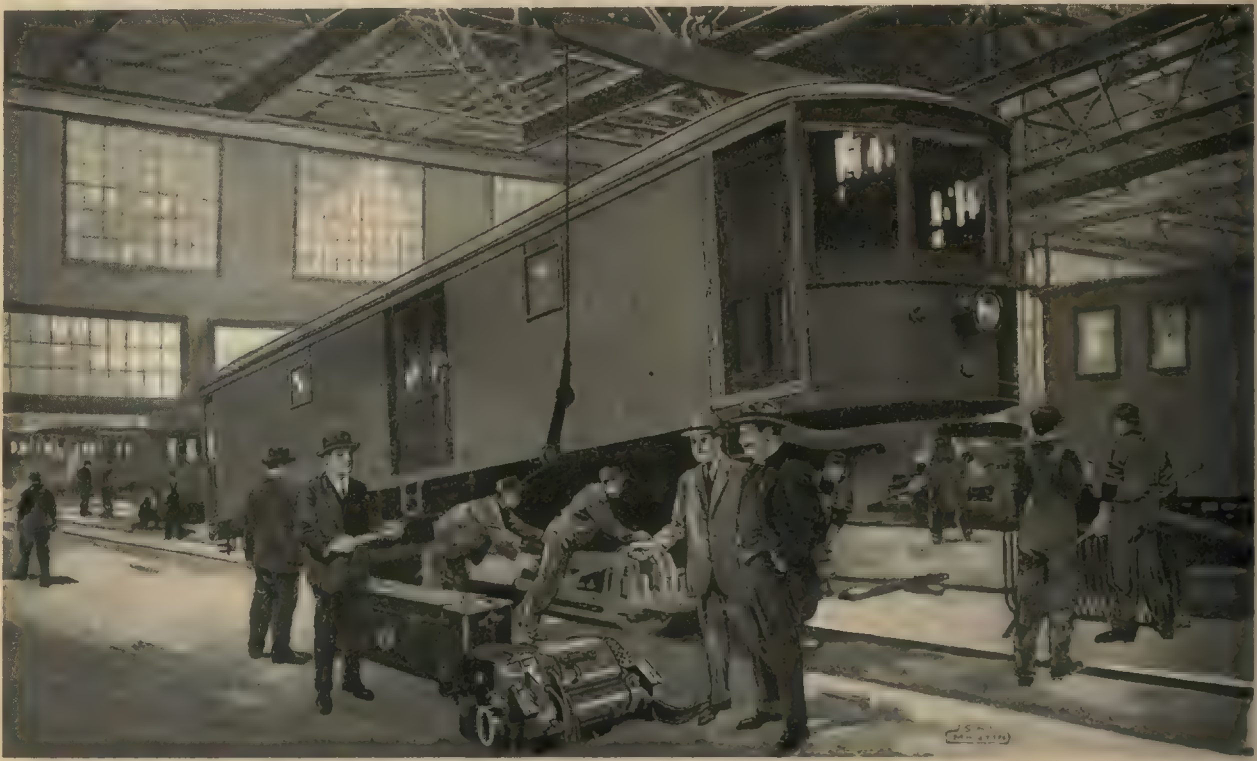
McGraw-Hill Co., Inc. March 26, 1921 Twenty Cents Per Copy

ELECTRIC RAILWAY JOURNAL


They speed up loading
-thus shortening stops
~and increasing schedule speeds
They simplify conductors work
~and satisfy the public
~and get the maximum number of fares
-with the result that they increase gross revenue 3% to 10%. Write to any of the 243 roads using them for verification and to us for all the facts
W.J. Higgins

Johnson Fare Boxes
and Metal Tickets

Johnson Fare Box Company, Ravenswood, Chicago, Ill.



Freight Transportation

An Opportunity Practically Untouched

"Joe," said the Vice-President, "The recent action of the Indiana Farmers Association to aid the Electric Railways in developing freight transportation in rural communities proves conclusively that when the people clearly appreciate the full measure of service their Interurban line may render, they will see that all burdensome and unbusinesslike restrictions are removed."

"Yes, Boss," replied Joe, "We are all beginning to realize that point. Our manager in charge of public relations has done a wonderful job in a short time in educating the Public as well as our own people. I know it will make a big hit with the Farmers when they see our new Baldwin-Westinghouse Locomotives and the four new Baggage Freight Cars equipped with Westinghouse No. 333 motors and HL control."

Westinghouse Electric & Manufacturing Co.

Sales Offices in All Large American Cities

East Pittsburgh, Pa.

Vol. 57, No. 13 New York, March 26, 1921 *Pages* 581-624

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing-Editor

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Method for Mitigating Electrolysis in Winnipeg

Three-wire system has been applied to bring ground return conditions of the Winnipeg Electric Railway into conformity with "Electrolysis Act" passed by the legislature of the province of Manitoba. W. Nelson Smith, the engineer responsible for the work, tells what has been done to date and why...Page 584

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Advertising Index—Alphabetical, 44; Classified, 38, 40, 42; Searchlight Section, 36-37

Facilitates Multiple-Unit Operation

WESTINGHOUSE

"Tight-Lock"
(AUTOMATIC)

CAR AND AIR COUPLER FOR TRACTION SERVICE

It takes a good coupler to meet the exacting requirements of short headway, multiple-unit operation in the big, busy city of modern times. That is why the largest Electric Railways in the world specify "Westinghouse Tight-Lock."

This is the Car and Air Coupler that forms an absolutely rigid joint, locks with a grip that never yields, and establishes permanently perfect air connections for Air Brake operation. Made in heavy and light designs for all classes of service.

Westinghouse Traction Brake Co.
General Office and Works, Wilmerding, Pa.

Mexico City
Boston, Mass.
Chicago, Ill.
Columbus, O.
Denver, Colo.
Houston, Tex.
Los Angeles, Cal.
New York, N. Y.
Pittsburgh, Pa.
San Francisco, Cal.
Seattle, Wash.
St. Paul, Minn.
St. Louis, Mo.
Washington, D. C.

Says the Safety Car Committee American Electric Railway Association 1920 Report

"The result of this year's study is to *confirm* in its broad lines the experience gained during the previous years with safety cars, this year's report having the authority of 3,000 cars instead of 1,100 of the former report. . . .

"In average cases of small cities, or of lines in *any sized* city where traffic is light and limited in amount, an average saving in operating expenses may be effected by substituting safety cars *car for car* for existing two-man cars of approximately:

45% in Trainmen's Wages
30% in Maintenance of Cars
25% in Cost of Accidents
30% in Cost of Power

"For the average system these savings aggregate 20% of the operating expenses. No increase in *gross earnings can be materially increased by more frequent headways.* In the companies reporting this year an average of 40.5% increase was made in car frequency with safety cars compared to former two-man cars. . . .

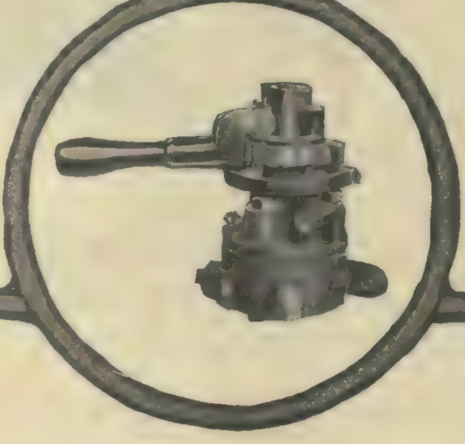
"Reports of its (the safety car's) successful operation and of its *appreciation by the general public* come from widely-separated localities and justify the feeling that

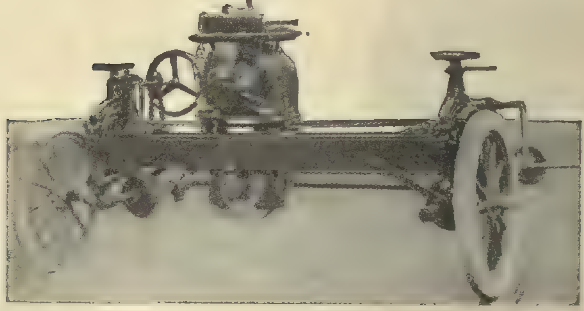
"There are very few, if any, local questions affecting its adaptability"

All of the 3,000 cars mentioned in this report are equipped with the standard Safety Devices Combination of this company.

Safety Car Devices Company

Boatmen's Bank Bldg., St. Louis
Chicago San Francisco New York Washington Pittsburgh



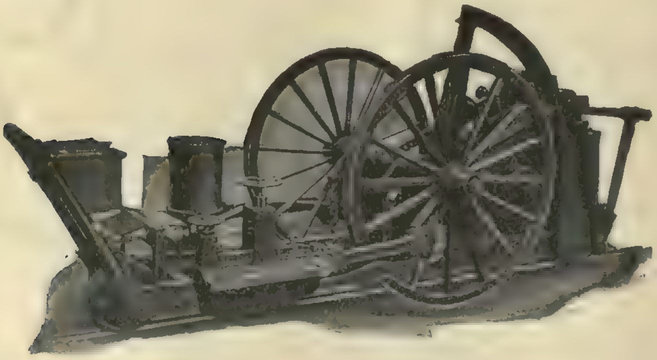


Bad Track Conditions

never cure themselves. They keep getting worse, unless prompt measures are taken.

And the worse they get, the more it costs.

Your solution lies in the use of one of these three track grinders.



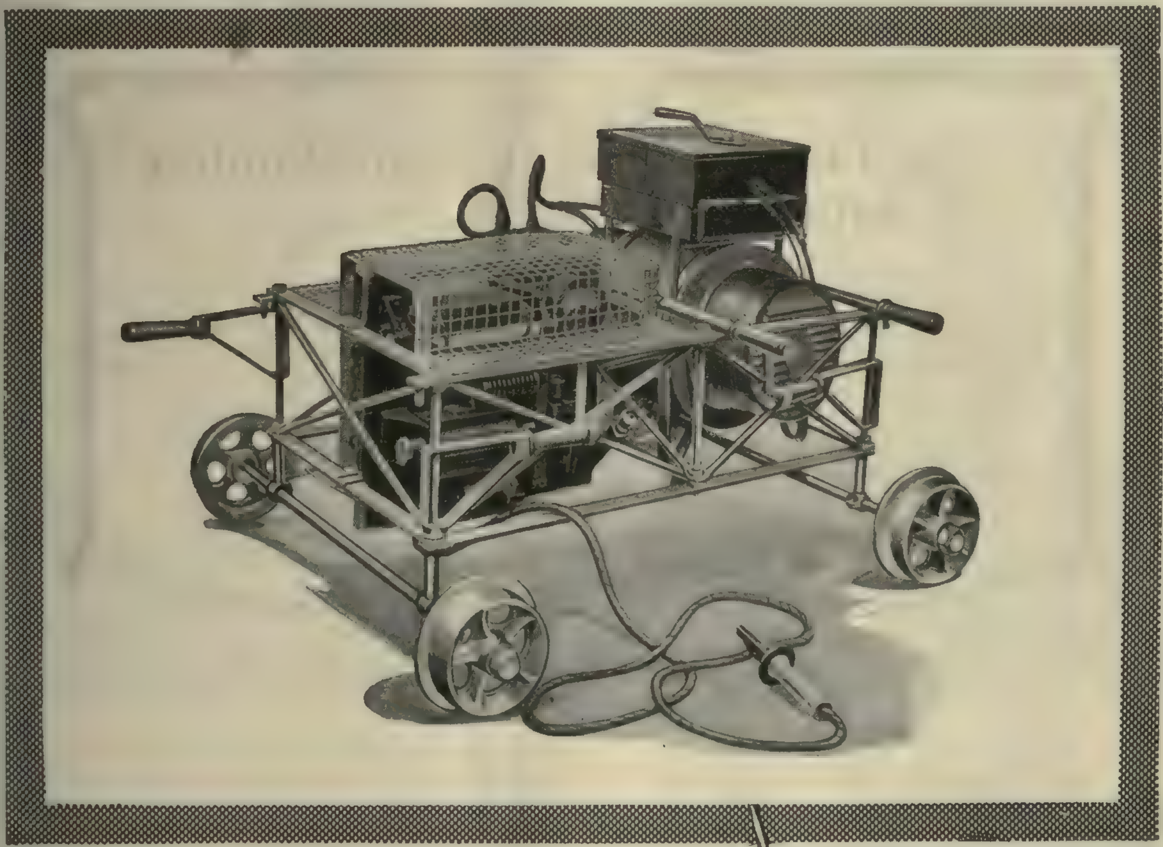
RAILWAY TRACK-WORK COMPANY

3132-48 East Thompson St., Philadelphia, Pa.

Announcing the New

Wilson **Plastic-Arc** Rail Bond Welder

Designed from the Wheels up for Rail Bonding



Welding experts co-operated with rail bond specialists to produce the Wilson **Plastic-Arc** Rail Bond Welder. The machine is made by the Wilson Welder & Metals Co. and sold by The Ohio Brass Co.

Wilson engineers from their long experience are thoroughly capable of designing an electric welder. Wilson machines have earned a remarkable reputation. O-B Engineers—as you know—are thoroughly familiar with rail bonding in all its phases.

The Wilson **Plastic-Arc** Rail Bond Welder, therefore, includes the most sound and progressive ideas of the welding art and meshes with the conditions surrounding rail bonding and track work.

It is a dynamotor using the metallic arc process. The styles: one machine operates on 350 to 650 Volts D.C.; and the other on 175 to 350 Volts D.C.

THE OHIO BRASS COMPANY, Mansfield, Ohio

Manufactures: **Rail Bonds, Trolley Materials,**
High Tension Porcelain Insulators,
Third Rail Insulators,
Electric Railway Car Equipment.

New York, Philadelphia, Pittsburgh,
Chicago, San Francisco, Los Angeles,
Paris, France

Rail Welding and Bonding Company
formerly The Lincoln Bonding Co.
RW&B
Cleveland, Ohio.

Fish Plate Welding

The Lincoln Carbon Arc Process using the RWB Dynamotor makes a welded joint for new and old track which costs less and lasts as long as the rails themselves.

RW&B

USE
The
RWB
Dynamotor
for
All
Track
and
Shop
Welding

Rail Bonding

Lincoln Bonds are installed with the RWB Dynamotor in approximately one minute actual welding time. This gives the bonding crew an opportunity to put on bonds quickly, and with unsurpassed permanence.

RW&B

Steel Twin Tie Track

Will save you money now!

GIVEN unlimited funds, it is easily within engineering possibilities to design and construct a permanent type of paved street track. But, of course, such track will be expensive.

It is the building of structures in which low initial cost is combined with the requisite permanence that is true engineering.

Our conviction that this combination of economy and permanence is the outstanding characteristic of STEEL TWIN TIE TRACK is fostered by our rapidly growing business with representative railway companies.

Write today for cost data, track plans and prices on Steel Twin Ties at your delivery point.

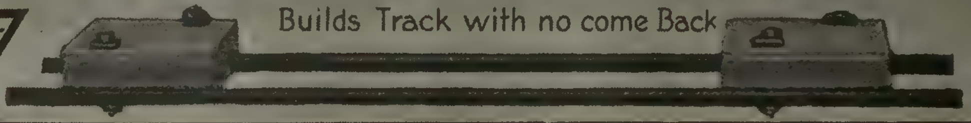
The International Steel Tie Company
Manufacturers of Steel Twin Ties and Crossing Foundations
16702 Waterloo Road CLEVELAND, O.

International Steel Twin Ties manufactured and sold in Canada, by Sarnia Bridge Co., Ltd., Sarnia, Ont.

Steel Twin Tie Track

The RESILIENT RAILWAY TIE

Builds Track with no come Back



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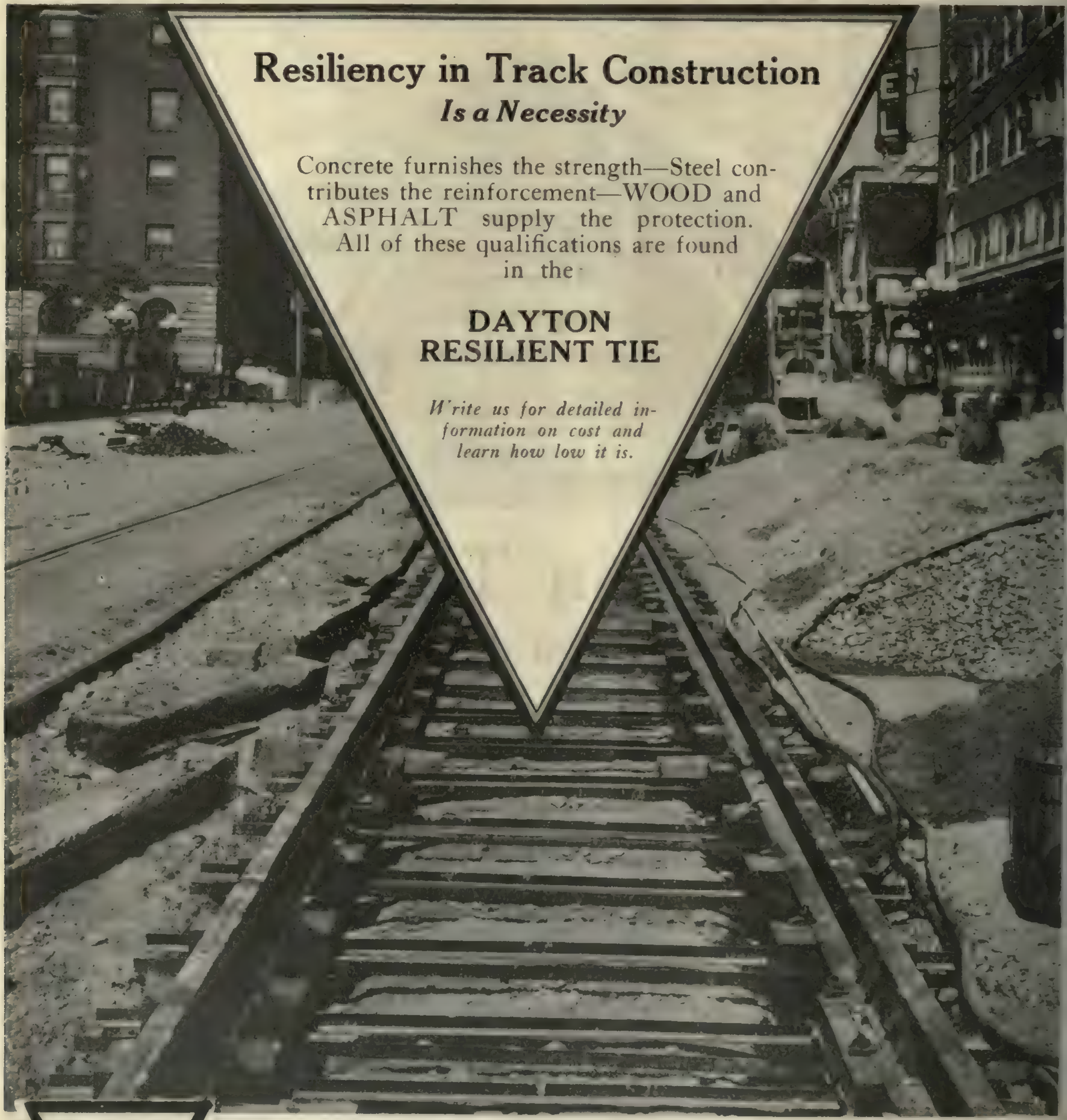


Resiliency in Track Construction

Is a Necessity

Concrete furnishes the strength—Steel contributes the reinforcement—WOOD and ASPHALT supply the protection. All of these qualifications are found in the

DAYTON RESILIENT TIE

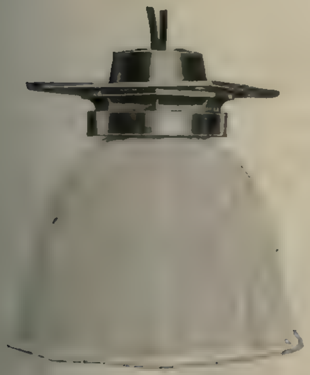
Write us for detailed information on cost and learn how low it is.

DMT Co

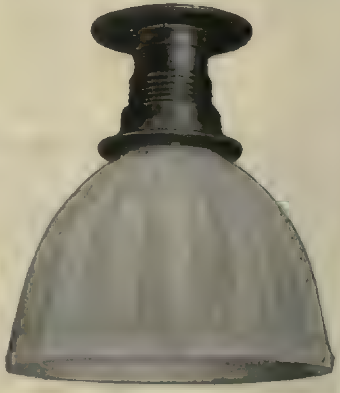
THE DAYTON MECHANICAL TIE COMPANY
704 COMMERCIAL BUILDING, DAYTON, OHIO

"Safety" Car Lighting Fixtures

Eliminate Broken Glassware—Decrease Lighting Costs



Semi-flush Type Fixture



Round Base Fixture

"Safety" Car Lighting Fixtures are specially designed for Railway use. They will not rattle in the holder; are free from loose screws, springs or other intricate parts; they hold the reflector primarily by flexible fingers so that the reflector cannot possibly break or fall, and they necessitate only one-hand operation to remove and replace the reflector.

And you will find that "Safety" Fixtures when used in combination with suitable reflectors and Mazda lamps will almost invariably reduce current consumption 50% as compared with bare lamps. They are designed for use with various types and sizes of reflectors and lamps, so that proper relation between reflector and lamp is assured in any combination. Their superiority is best proved by the fact that they are in general use on steam and electric railways in the United States, their safety features being an almost universal requirement.

Your patrons will quickly appreciate the improved car lighting made possible by these fixtures.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA	NEW YORK	CHICAGO
17th and Cambria Streets	50 Church St.	Monadnock Building

Branch Offices: Boston, Scranton, Pittsburgh

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto

It Pays to Educate Your Employees

This subject is receiving attention from many managers to whom it constitutes an entirely new problem.

These officials are not deceived as to the *cause* of the unrest, waste, and lack of co-operation on their property—they recognize the fact that the mental attitude of their workers is negative and destructive, and requires educational reconstruction.

The Sherman Organization is thoroughly equipped to analyze the mental condition of your men, and to develop adequate instruction, stimulation and training in morale and co-operation, which will greatly decrease your present costs. Our success in this field has built for us the largest business of its kind in the world. Our experience and skill is at your disposal, and should be worth thousands of dollars on *your* property.

You are invited to confer without obligation regarding a suitable application of our service to greatly increase *your* results.

SHERMAN SERVICE INC.

Production Engineering Industrial Co-ordination

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Montreal
Drummond Building

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Toronto
10 Adelaide St., East

Largest organization of its kind in the world. Founded April 7, 1910

SHERMAN SERVICE

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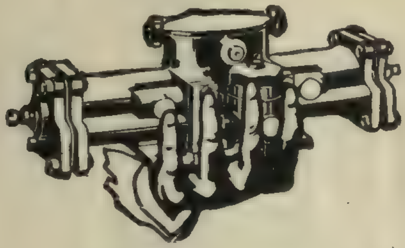
DOUBLE-TRUCK ONE-MAN CAR OF SECOND AVENUE RAILROAD

National Pneumatic Door and Step Control For Any Service

Pneumatize!



Modernize!

The Second Avenue Railroad Company of New York had 100 twelve-bench open cars.

It had no money for new equipment, but it was determined to give up-to-date service just the same.

What did the company do?

It rebuilt these cars to closed type with the popular cross seat in the majority in order to attract patronage.

And it arranged for safe, easy and economical one-man car operation for headways down to 2¼ min. by installing folding doors and steps operated by National Pneumatic door engines.

If you, too, want to *make the best out of what you have,* let us work with you as we did with this live management.

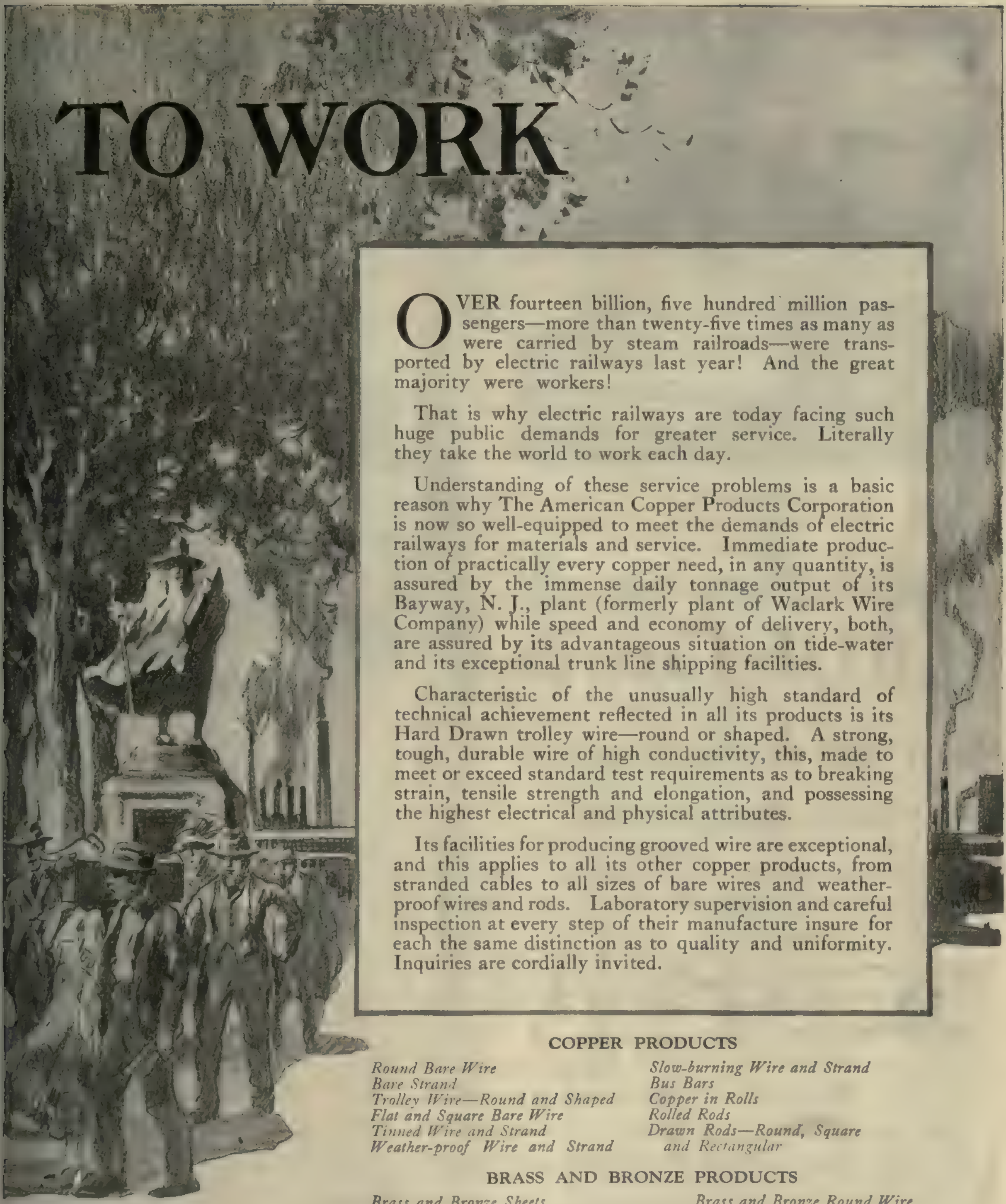
National Pneumatic

Door and Step Control
Motorman's Light Signals
Door and Step Operating Mechanisms
Interlocking Safety Door Control
and
Multiple Unit Door Control

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd.
Toronto, Ont.

National Pneumatic Company, Inc.
50 Church St., New York
Edison Bldg., Chicago
Works: Rahway, N. J.

TAKING the WORLD
RESTAURANT
FRONT ST



OVER fourteen billion, five hundred million passengers—more than twenty-five times as many as were carried by steam railroads—were transported by electric railways last year! And the great majority were workers!

That is why electric railways are today facing such huge public demands for greater service. Literally they take the world to work each day.

Understanding of these service problems is a basic reason why The American Copper Products Corporation is now so well-equipped to meet the demands of electric railways for materials and service. Immediate production of practically every copper need, in any quantity, is assured by the immense daily tonnage output of its Bayway, N. J., plant (formerly plant of Waclark Wire Company) while speed and economy of delivery, both, are assured by its advantageous situation on tide-water and its exceptional trunk line shipping facilities.

Characteristic of the unusually high standard of technical achievement reflected in all its products is its Hard Drawn trolley wire—round or shaped. A strong, tough, durable wire of high conductivity, this, made to meet or exceed standard test requirements as to breaking strain, tensile strength and elongation, and possessing the highest electrical and physical attributes.

Its facilities for producing grooved wire are exceptional, and this applies to all its other copper products, from stranded cables to all sizes of bare wires and weatherproof wires and rods. Laboratory supervision and careful inspection at every step of their manufacture insure for each the same distinction as to quality and uniformity. Inquiries are cordially invited.

COPPER PRODUCTS

Round Bare Wire
Bare Strand
Trolley Wire—Round and Shaped
Flat and Square Bare Wire
Tinned Wire and Strand
Weather-proof Wire and Strand
Slow-burning Wire and Strand
Bus Bars
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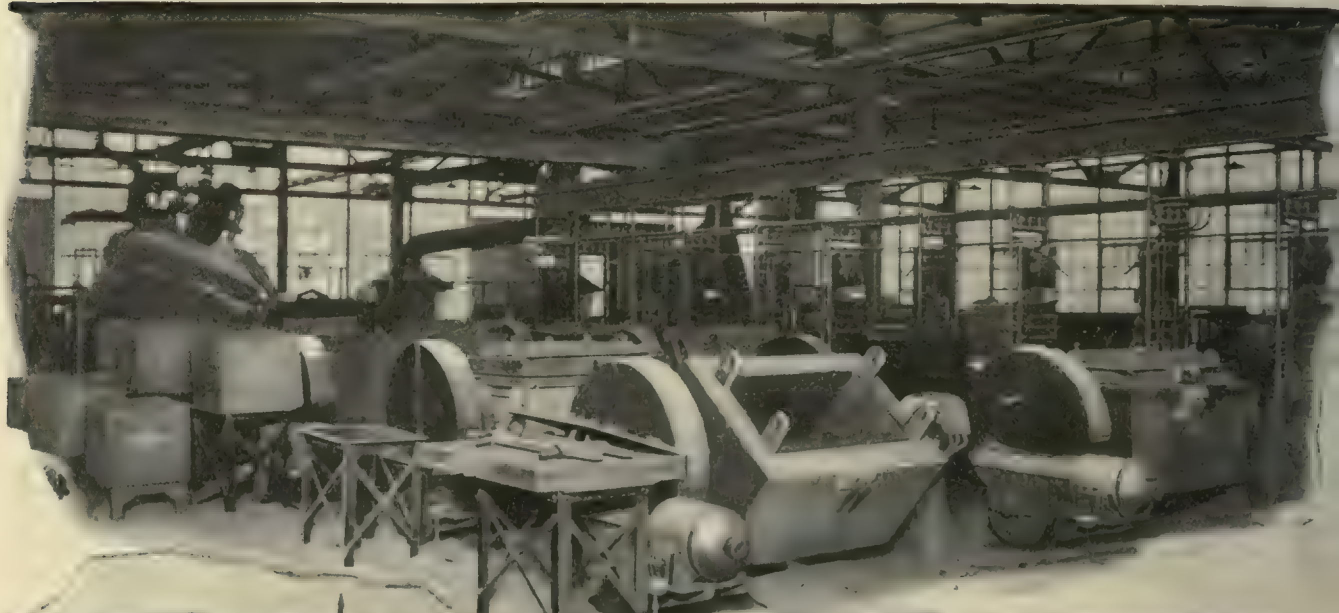

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Electric Railway Journal

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New York Association Enthuses Over Trolley Freight Business Prospects

THE quarterly meeting of the New York Electric Railway Association, held in New York City on March 25, was considered by those in attendance to have been one of the most successful conferences held by the association in recent years. The program was short, it was prepared on short notice and brevity was the feature of the papers and contributions to the discussions. The amount of information brought out, however, was large, and it all related directly to the questions under discussion, *i.e.*, valuations, taxes, safety cars and freight and express business.

Possibly that part of the discussion which was of the widest application related to the merchandising methods used in the selling of freight and express service. The testimony was unanimous in showing the desirability of this service when its quality is good and its virtues are duly advertised. The discussion further showed that time will favor greatly the development of this business, because the operators of motor trucks are now finding out that it is unprofitable to compete with the rail lines over very long distances. The steam railroads will likewise soon reach the same conclusion with respect to extremely short distances. Electric railway service will therefore predominate between the limits of radius of operation which are set by economic considerations. The delay in settling down to an equitable division of the field has been due simply to the failure of both the truck owners and the steam railroads to realize the true economics of the freight haulage business, as well as to the partial failure of the electric railways in the past to go after their legitimate share of the business with the conviction and vim that are necessary to the greatest success.

Swapping Experiences Regarding Equipment Maintenance

IN ALL classes of work there is much satisfaction and considerable value to be obtained through discussion with others intimately connected with the same line of work. For this purpose the movement to form associations of master mechanics and equipment engineers in sections which do not extend over too great an area is very commendable. A noteworthy example of such an organization which has been in operation since March, 1918, is that of the Association of Electric Railway Men with members located in a radius of about 150 miles from Pittsburgh. The territory covered by this association extends north to Cleveland, Ohio, east to Johnstown, Pa., south to Clarksburg, W. Va., and west to Columbus, Ohio. Much benefit has been obtained from the round-table discussions which have taken place at this association's meetings and the railway men have been brought closer together by the exchange of ideas, thus tending toward the betterment of operation and the reduction of equipment maintenance costs in general.

Among the men who benefit most by affiliation with such an organization as this are those who have not been able to get to the national conventions, due to the expense involved and to the time necessary for making the trip where properties are located at a considerable distance from the place where the conventions are held. By the arranging of local associations in districts of not too great an area, this objection is overcome. It is understood that at the present time the forming of associations is contemplated or they are in the process of being formed in the South near Louisville, Ky., and in central New York. This movement should spread and it can do so without in any way detracting from the work of the Engineering Association, but rather the reverse. Representatives of the various standing committees can obtain a large fund of information and many valuable ideas from the experiences of the men actually doing the work, and there is nothing like a round-table discussion of a few intimate associates to bring out the good and bad points of equipment and to devise means which will satisfactorily overcome the troubles.

Three-Wire System for Electrolysis Mitigation in Winnipeg

THE Winnipeg Electric Railway is making what is probably to date the largest single contribution of experimental information on the use of the three-wire system in controlling electric railway return current. After careful investigation the railway adopted this means as the most practicable one for meeting the rather rigid specifications laid down by the city fathers. The railway's complete scheme involves some changes in the substation layout and the distribution system, but the three-wire arrangement is mainly depended upon to reduce potentials and potential gradients in the track to conform to the specifications prescribed by the city.

In order to prepare itself to meet the municipal specifications the railway company nearly three years ago engaged a railway man of long experience, W. N. Smith, as resident consulting engineer, to make an exhaustive study of the whole proposition. The result was a firm conviction on his part that the three-wire system would "fill the bill." As soon as this conclusion was reached, plans were made to apply it, and much interesting research work was done. The story of the progress made to date is given by Mr. Smith in this issue of the paper. The publication this week is timely because on April 1 the city expects the problem to have been solved and will presumably proceed to check up the work done by the railway company. From the data given in the present article it would appear that the test will be met in a satisfactory manner.

The three-wire system has been used from time to time on a larger or a smaller scale, the most ambitious undertaking on direct-current railways being that of the Pacific Electric Railway. In an article in the issue of this paper for Feb. 26, 1916, S. H. Anderson, electrical superintendent of the Pacific Electric, gave the results of a year's experience with the plan on 125 miles of track. He made this significant statement: "There is nothing that can be accomplished in the matter of electrolysis mitigation by the use of an insulated negative feeder system which cannot also be accomplished by a three-wire system of distribution." In an article in the March 16, 1918, issue, Charles R. Harte, construction engineer the Connecticut Company, said: "As a means of reducing high potential gradients the change to the three-wire system is much less costly than a new substation or additional insulated negative feeder returns. There is, however, as yet not enough evidence available to say how much of the benefit is offset by the operating complications." The experience in Winnipeg will be of great value to the industry in verifying Mr. Johnson's conclusions, based on experience, and in supplying the lack mentioned by Mr. Harte.

Efficiency and Courtesy Will Strengthen Employees' Position

"THE day of sloppy work, violations of rules and insolence to public and employers is past." This is quoted from an editorial in an official publication of organized labor and it shows that at least some of the union workmen are thinking seriously of the future. Workmen are reminded in the editorial that the war is over, that the day of unwarranted strikes is gone, that immigration and lessened production have turned the advantage to the employers' side. In other words, a plentiful supply of labor has put an end to official leniency and tolerance of the past few years. Men are to be hired more carefully and held to a strict accounting for observance of rules.

Strikes are no cure for unemployment. The cool-headed trade union officials and representatives of Great Britain realized this a few weeks ago when they rejected a proposal for a general strike. The steam railroads are facing a situation of this kind, and the great packing house interests have been defied by the unions in their plans to go back to pre-war working conditions. A few electric railway companies have already reduced wages of trainmen and others have announced their intention to do likewise. The coming months are likely to bring a labor crisis on some of the larger properties.

Employees everywhere should ponder well over the circumstances before they take radical action. A "lost" strike may be the undoing of a union, as it was in Kansas City and several other notable instances. It will at least mean sacrifice of wages for an indefinite period, and it is well to consider that a lowered wage is better than none at all. Similarly it is better to forego some working conditions than to lose a job. We know of one company where concessions to the men in the form of shorter working hours and additional bonus time made it necessary to add several thousand trainmen to the force in order to keep the same number of cars in service. This, of course, added materially to the cost of transportation.

Wages were advanced throughout the country during the past few years because cost of living increased and because in some cases platform men were not to be had except by tempting offers. It was the old situation of supply and demand getting closer together. Now conditions have changed. All reports agree that cost of living is on the downward path. It is to be expected that wages also will have to go down.

The public soon will be looking for lower carfares. Its hopes will be realized only if costs of operation are reduced. Employees will not be making a popular move if they refuse to recognize the new status of affairs. Meanwhile they may strengthen their position by efficient and courteous service.

Some Exact Knowledge of Automatic Substation Operation

THE industry is greatly indebted to Charles H. Jones and the Chicago, North Shore & Milwaukee Railroad for the study and record of automatic substation operation which appear elsewhere in this issue. There has been an accumulating faith in the reliability of the automatic control, but it has been based on the absence of trouble without full knowledge of the service which the control was called upon to handle. Mr. Jones' scheme of checking up on the automatic stations has developed two things: a startling revelation of the large number of complete operations performed, and the remarkably low number of failures per given number of operations. For the five stations on which data were collected, 100,608 complete operations were accompanied by only 119 failures, or 1.18 failures per thousand operations, including a station where a defective brush-lifting device caused an abnormally high number of failures. Omitting this station, which involved only 7 per cent of the total number of operations covered by the study, although 40 per cent of the failures occurred there, the number of failures per thousand operations for the remaining four substations was 0.78. This gives a clear exposition of the ruggedness and reliability of the automatic equipment, for it is probable that the average operator in a manually controlled station will make more than one failure per thousand operations in starting up a station, synchronizing and throwing in on the line.

Chief among the advantages apparent from Mr. Jones' study is that to be derived from the interspacing of substations on existing railways, a plan made economically possible by the absence of need for an operator. Nearly all interurban roads are now laid out on a plan of grouping two or more rotaries in each substation. If some of these machines were installed in new stations located at points midway between existing stations, considerable improvement in the trolley voltage, and hence the service, and marked reduction in power losses would result. The possibilities here are so important as to deserve the immediate attention of nearly every railway system. This is substantially the procedure which was followed on the North Shore line, for of the six machines automatically controlled, four are old ones removed from existing stations.

The fact that the individual old converter will in many instances be of capacity too small to handle by itself the total load of a train starting in its immediate vicinity is not a controlling factor, for the use of the load-limiting resistance enables the machine to remain on the line and carry only a normal overload. This ability to carry a greater load per unit is demonstrated by the experience on the North Shore line, where an increase in converter type of 52.6 per cent has made it possible to handle approximately one hundred per cent increase in total power produced. This was made possible largely through the interspacing of stations, which in turn was made feasible by the automatic. Detail estimates which have been made of the savings available through distributing the existing machines along the line in accordance with present day railway power engineering show that the total cost of the change can be written off in from one and a half to two years.

Aside from bringing out prominently the considerations already mentioned, Mr. Jones' contribution to the industry satisfies in a way the curiosity felt by most power men as to what is going on between inspections in the attendantless substation. There is the further gratifying finding that the wear on contacts and other parts of the control equipment is extremely small, indicating long life and low maintenance cost.

Wage Reductions and Fares

NOW that many of the electric railways, like other industries, are contemplating the reduction of wage scales as agreements expire, it is pertinent to consider what the relations are between wage reductions and fare reductions. Undoubtedly many people are under the impression that as so much of the cost of the carfare is labor, important reductions in electric railway fares may be expected contemporaneously with lower wages. But those responsible for the operation of the traction companies should be on their guard against leading the public to expect too much in the way of immediately lower fares.

In the first place it should be remembered that increases in carfares lagged considerably behind the original wage increases, and that even the 10-cent fares that now exist in some places are only double the old rates, while street railway wages are generally much more than double the rates of ten years ago.

Secondly, there seems to be little likelihood that the approaching reductions can bring wages back to anything like the old rates. It is only a few years since many companies paid rates in the neighborhood of 20 cents an hour. Does any one look for a return to these conditions in the near future?

Suppose a company puts into effect a wage scale approximately 20 per cent lower than the existing one. That would represent, say, a drop from 60 cents per hour to 48 cents. A sudden change of this amount would require a very great change in the family budget of the workman. Yet even were this done, how much fare reduction might be expected? Roughly speaking, payrolls of the average traction company will average about 50 per cent of the total revenue. To reduce the payroll 20 per cent might then permit of an equivalent reduction in revenue of 10 per cent. This would mean that a 10-cent fare might be reduced to 9 cents. A 7-cent fare reduced 10 per cent would be 6.3 cents. Some reductions may also be expected in the costs of materials, but interest rates have shown no tendency to come down, and where a company has had to refund during the last few years any considerable issues, the increase in interest rates is a serious one.

It is difficult to see where wage reductions of much more than 20 per cent can be looked for in the immediate future and the companies could well use any saving due to lower wage scales and lower costs of materials to build up a reasonable surplus fund, similar to the "barometer" funds of some of the service-at-cost plans. They could then better afford to experiment with reduced fares when intrenched in a stronger financial position than most of them now find themselves.

A. R. E. A. Convention Reports Are Up to Usual Good Form

THE sterling character of the committee reports presented to the American Railway Engineering Association at the Chicago convention held last week are apparent to those who have taken the trouble to read them. The association is functioning true to form, and the committee work continues to be of a high order of excellence. In general the work which the association is doing is of untold value to the railway engineering profession and a reading of its committee reports cannot do otherwise than to inspire railroad men to greater efforts.

There is one feature of the association work which greatly enhances its value to the members. This is the publication of its committee reports in bulletin form so that most of them are in hand long before the convention; the members are thus given time to study the reports and prepare for discussion at the convention. It may not be out of place to suggest that similar publication of reports by the American Electric Railway Engineering Association would be worthy of consideration by the executive committee of the latter association.

The railway engineers continue to find difficulty in inducing a more general adoption of their standards and recommendations by the individual railroads, and a concerted effort is being made with the view of securing a wider use. The lack of interest displayed in the standards is in parallel with that found in the electric railway engineering field, where the individual members have also been loath to adopt the standards and recommendations promoted by the American Electric Railway Engineering Association. It is evident that both associations must continue their efforts toward "selling" their standards.

An abstract of some of the more important details of the committee reports will be given next week, but it will not be possible, in the space allowed, to go deeply into the numerous phases of railroad engineering which are covered by the twenty-three standing committees whose reports cover practically the entire range of railroad construction, operation and maintenance. The magnitude of the work accomplished by the association in the twenty-odd years of its existence is indicated by the fact that the 1921 edition of the Manual, which has not been completely revised since 1915, will contain approximately 1,000 pages. This will be a veritable encyclopedia of railroad engineering.

Quotation from the Federal Electric Railways Commission Report

No. 13

THE electric railway problems admit of a satisfactory solution once the elements that compose them are made known and the process of ordinary economic and business common sense is applied. The duty of both the public authorities and those who control the electric railway enterprises of the country is plainly indicated. The time has come for a permanent and satisfactory settlement of the traction question. The interests of both the public and the companies lie so exactly parallel in almost every respect that there ought not to be any serious difficulty in arriving at a solution if both parties approach the subject in a proper spirit.

Electrolysis Mitigation in Winnipeg

Three-Wire System Has Been Applied to Bring Ground Return Conditions of the Winnipeg Electric Railway Into Conformity with "Electrolysis Act" Passed by the Legislature of the Province of Manitoba — Engineer Responsible for the Work Tells What Has Been Done to Date and Why

BY W. NELSON SMITH
Consulting Electrical Engineer Winnipeg (Man.) Electric Railway

FOR some years the corrosion of cast-iron water mains in Winnipeg has been a subject of controversy between the city administration and the Winnipeg Electric Railway, as potential differences existed in the railway tracks which permitted a leakage of stray current to underground structures. In 1914, at the request of the Manitoba Public Utilities Commission, which had been established two years previously, the late Prof. Albert Ganz of Hoboken, N. J., made a survey of conditions and reported on them in 1915. This report was summarized in a number of recommendations, establishing limits of track potential differences, calling for permanent means of observing them and favoring an additional substation and insulated negative return feeders on the old two-wire system. These, up to 1915, were the only methods considered practical for mitigating electrolysis conditions. The three-wire system had not then won the general recognition that it did a year or two later.

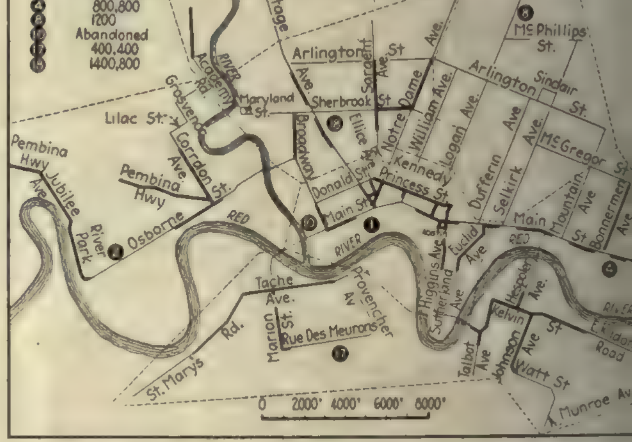
In view of the great capital expenditure and the extra loss in power and car speed incident to the two-wire return-feeder system Professor Ganz's report not only left the details of feeder distribution to the railway but expressed his recommendations so broadly as to make the use of the three-wire system possible.

PROVINCE PASSES "ELECTROLYSIS ACT"

In 1917 the company installed a couple of negative boosters with insulated track feeders at two of its substations. In the spring of 1918, as part of a contract between the railway and the city, which involved the abolition of jitneys by the city and the undertaking of various improvements by the company, the company agreed to follow the recommendations of Professor Ganz, as embodied in the "electrolysis act," which in the meantime had been passed by the Manitoba Legislature, making into law most of the Ganz recommendations with some modifications and omissions. The provisions of the act respecting electrical drainage of underground cables placed that matter under the jurisdiction of the commission. Drainage of gas and water pipes is forbidden by the act. This was the situation when the writer, in June, 1918, undertook the task of reducing the track potentials and gradients to within the prescribed legal limit.

An engineering study of the situation showed clearly that, due to the heavy cars in use and light weight of rails employed, the same amount of copper would go very much farther if used on the three-wire system of distribution than on the two-wire system of insulated negative return feeders. The latter, up to the time that Professor Ganz made his examination and report, had been regarded as the only available practical method of reducing track potentials and stray currents. The process of final adjustment in equalizing track potentials
is also carried out more conveniently by the three-w
than by the two-wire system. In view of the financ
situation at the time, these advantages of the thr
wire system were too important to be disregarded, ev
though it involved a departure from previously est
lish standard ideas and methods.

The three-wire system was first worked out on
large practical scale in this country in the Los Ange
district in California in 1915 (after Professor Ga
made his report). It was so successful in reduci
track potentials and gradients and in stopping the el
trolysis troubles resulting from them that the Unit
States Bureau of Standards had paid special attenti
to its application, not hesitating to recommend its ad
tion in other places, and had formulated the theory
applying the three-wire system in practice along li
that would be of greatest service in automatically p
tecting underground cables as well as water pipes.



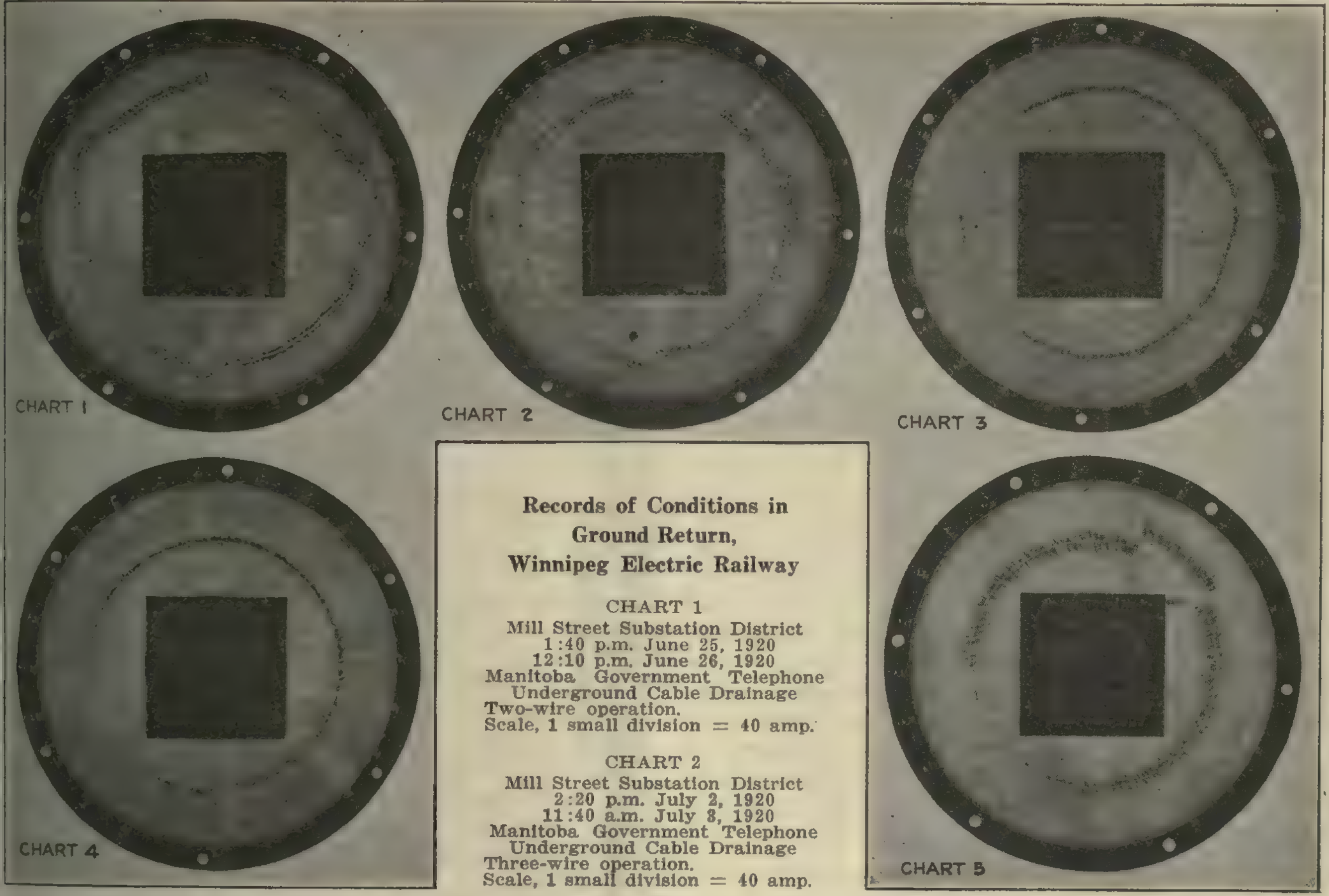
SKELETON MAP OF WINNIPEG, SHOWING ELECTRI
RAILWAY LINES, RAILWAY SUBSTATIONS
AND THREE-WIRE ZONES

STATUS OF THE THREE-WIRE SYSTEM IN 1918

The "state of the art" in 1918 was very carefu
investigated by the writer, who found that the thr
wire system was then in successful operation in Brisba
Australia; in the vicinity of Los Angeles, Cal.;
Omaha, Neb., and in Milwaukee, Wis., with instal
tions projected for immediate use at Springfield, Mas
and Wilmington, Del., and recommended for New
leans, La.

From the accumulated practical experience from va
ous sources of first-hand engineering information,
appeared that the conditions of trolley distribution

Winnipeg lent themselves readily to changing the system over from two-wire to three-wire operation. Besides the heavy cars in use and the light rails, the substation motor-generator units are of sizes available for balancing in three-wire operation with a minimum of rearrangement, and all permanent substations but one had at least two machines. The feeder distribution is nearly all overhead. The trolley lines were originally subdivided into very few sections, and this fact had given rise to more or less inconvenience at times of accidental breaks in the trolley system so that the operating staff rather welcomed the idea of sectioning the lines.



Records of Conditions in Ground Return, Winnipeg Electric Railway

CHART 1
Mill Street Substation District
1:40 p.m. June 25, 1920
12:10 p.m. June 26, 1920
Manitoba Government Telephone Underground Cable Drainage
Two-wire operation.
Scale, 1 small division = 40 amp.

CHART 2
Mill Street Substation District
2:20 p.m. July 2, 1920
11:40 a.m. July 8, 1920
Manitoba Government Telephone Underground Cable Drainage
Three-wire operation.
Scale, 1 small division = 40 amp.

CHART 3
Mill Street Substation District June 2, 1920
Track potential in volts from Higgins and Main to Portage and Main; distance 3,450 ft.
Two-wire operation.
Scale, 1 small division = 1 volt.

CHART 4
Mill Street Substation District Nov. 23, 1920
Track potential in volts from Higgins and Main to Portage and Main; distance 3,450 ft.
Three-wire operation.
Scale, 1 small division = 1 volt.

CHART 5
Fort Rouge Substation District June 19, 1920
Track potential in volts from substation to Grosvenor and Stafford; distance 10,350 ft.
Two-wire operation from 1:35 p.m. to 4:05 p.m.
Three-wire operation, rest of chart.

The paramount consideration was the reduction of track potentials and gradients to within the limits required by law, so it was regarded as a matter of minor importance whether the cars of certain lines were kept continuously on the same feeder and trolley sections or not. It is sometimes thought that it is unwise to take a chance of stalling the cars of some particular line at one part of their run, by reason of some electrical failure that affects one section but not the others, but as the Winnipeg car lines are not susceptible to a great degree of segregation in the center of the city this feature did not require special treatment, and after more than a year's operation in one district and some months' operation in two other districts, one of which is the central district of the city, there has developed no reason to revise the general arrangement of sectioning. Line failures are rare, and in extreme cases of emergency everything can be paralleled on the two-wire system, if necessary.

The general method adopted for three-wire operation is the so-called "sectional method," in which the alternate sections of any double-track or single-track line are of opposite polarity, progressively along the line.

The general method of sectioning followed is to set off three zones from each substation to the extremity of its feeding district, and to reverse the middle zone of the three. A number of variations have been made from this general standard to meet particular cases, but this general principle was the one adopted, it having been established by E. R. Shepard of the Bureau of Standards that this combination offers the lowest reduction of track potential combined with the tendency for stray currents in underground cables to flow continuously toward the substation, as compared with any other system of sectioning.

The Winnipeg Electric Railway's original system of substations and railway generating units, as arranged prior to 1918, was as follows:

No.	1	Mill street station	1—1,500-kw.	1—1,200 kw.	3—800 kw. M.G.sets
	2	Fort Rouge substation	1—1,000-kw.		
	3	St. James substation	1—1,200-kw.	1—1,000-kw.	
	4	North End substation	2— 800-kw.		
	8	Logan Ave. substation	1—1,200-kw.		
	10	Assiniboine substation	1—1,400-kw.		
		Total capacity	12,500-kw.		

It had been realized that any scheme for the mitigation of electrolysis would probably necessitate the utilization of every pound of feeder copper that could be made available from the entire railway and lighting system of the company. It had, therefore, been decided before the writer was retained that a new substation should be created in St. Boniface, east of the Red River, at a point contiguous to the right-of-way of the 60,000-volt transmission line over which power is transmitted from the hydro-electric power plant to the receiving station at Mill Street, for by so doing a heavy alternating current feeder of six 500,000-circ.mil cables, about 2 miles in length, serving a large power customer, could be nearly all salvaged for trolley feeder purposes, and certain important power customers in St. Boniface would be given very much better service. The first thing to do was to design and build this new substation. This was fitted up throughout with electrical equipment taken out of various other substations of the railway, where it was not working at full capacity. The transformer equipment comprised three 1,000 and three 800-kw., 60,000/2,200-volt transformers, much of the 2,200-volt power being used for light and power customers in the vicinity.

To provide the trolley current for the lines on the east side of the Red River which this station was to feed, a motor-generator unit was created by reconstructing anew, from three disused engine-type generators removed from their engines, a three-unit railway motor-generator. The component machines consist of an 800-kw. 2,200-volt alternator used as the motor and two 400-kw. railway generators. The alternator originally ran at 90 r.p.m. and the railway machines at 100 r.p.m., but it was found upon testing the latter that they would operate satisfactorily at 90 r.p.m., so this combination was decided upon, and the machine was designed, erected and operated as a three-unit, three-wire machine. Thus three-wire trolley distribution was made possible in most of the district east of the Red River from the new St. Boniface substation. The load within easy reach of this substation was well within the capacity of this machine.

RESULTS IN THREE-WIRE OPERATION

The first demonstration of three-wire operation, however, was made in the district fed by the Fort Rouge substation. One of the 800-kw. machines was taken out of Mill Street substation and moved to Fort Rouge. The relatively small amount of change in the Fort Rouge switchboard was made during the winter of 1918-19; some 6 or 7 miles of feeder copper were transplanted into the Fort Rouge district, and the feeder system there rearranged, and on March 30, 1919, three-wire operation began in this district. It was successful from the start, although refined results were somewhat interfered with by the fact that the track potentials on the lines north of the Assiniboine River fed from stations No. 1 and No. 10 were exactly as they had been previously, and considerable return current going back to No. 10 station near Main Street from the district extending a mile or so to the west of it was shunted through the railway tracks across the bridges over the Assiniboine river. This changed the track potentials in the tracks in the Fort Rouge district from what they would have been had this shunting of track current been preventable.

Tests made in May, 1919, showed that the reduction of track potentials taken between the substation and the principal outlying points in the Fort Rouge district was from an average of 11 volts under two-wire operation to an average of 3 volts under three-wire operation, a reduction of 73 per cent.

THREE-WIRE DISTRIBUTION EXTENDED

These results were considered sufficiently good to warrant the extension of three-wire operation to the remainder of the system. On Oct. 1, 1919, the three-unit railway motor-generator at the new St. Boniface substation, above described, was placed in three-wire operation. The results in the St. Boniface district showed a reduction of the potential from St. Mary's road at the south city limits to St. Boniface substation, from 10 volts under two-wire operation to 4 volts under three-wire operation, and the potential difference between the intersection at Tache and Marions Streets and the St. Boniface substation, around the loop, was reduced from 5 volts to 1 volt.

The Mill Street substation, which is the largest of any, had its switchboard changed over for three-wire operation during the first half of 1920, and on July 1 three-wire operation was begun in the central district of the city. Everything tested out perfectly the day before the change was to be made, and the system has worked with perfect smoothness under the most congested conditions of city traffic on the principal streets in the center of the city. In this district the initial reduction in cable drainage current was 62½ per cent. This will subsequently be further reduced, because the present zoning arrangement of this central district is such as to cover a considerably larger area than will be the case later, on account of the fact that the Sherbrooke substation is not yet completed, and the Mill Street substation now has to carry not only its own territory but also that which will be ultimately carried by Sherbrooke.

The above reduction of stray current is shown in the pair of drainage charts here reproduced.

The track potential reduction in the heavily loaded Mill Street district is shown in a second pair of charts, while a fifth chart shows the reduction at a point in the Fort Rouge district, with a lighter load at a much greater distance.

In October, 1919, the writer submitted the complete plan for changing over the entire system to three-wire operation. This is shown on the map on page 584.

Among Professor Ganz's original recommendations in his 1915 report it had been suggested that a new substation should be constructed near the intersection of Portage Avenue and Sherbrooke Street, which is the center of a fairly heavy load. The significance of this recommendation lies in the fact that it is 3½ miles from Mill Street substation No. 1 to the St. James substation No. 3, on the west city limits, and that the traffic on Portage Avenue is quite heavy, with an appreciable traffic also to be cared for on Sherbrooke Street and on Sargent and Notre Dame Avenues, the next adjacent lines on the north.

The Assiniboine substation No. 10, located on Main Street near the Assiniboine River Bridge, had originally been the site of the first steam power plant, and although the steam plant operation had been discontinued for a number of years, the building had still been continued as a source of electric railway distribution by installing a 1,400-kw. motor-generator in it. This condition meant that No. 1 and No. 10 substations together, they not being very far apart, fed a large district for about a mile west of Main Street, and all the return current naturally had to flow back east toward Main Street, making a fairly heavy pitch or gradient of track potential all the way down Broadway, Portage Avenue, Sargent Avenue, and Notre Dame Avenue, from Sherbrooke Street to Main Street. The neutral point between Mill Street station and St. James substation was also near Sherbrooke Street. It was thus logical not only to transplant No. 10 substation to the west but also to select a new site for it in the vicinity of Portage and Sherbrooke Streets.

As the whole situation thus pointed to the importance of reducing the track potential between Sherbrooke Street and Main Street to the lowest possible amount, it was decided to transplant the Assiniboine Avenue 1,400-kw. machine to a new substation to be built in the above named locality and add an 800-kw. machine from Mill Street to it, in order to get three-wire operation in the new Sherbrooke district, replacing the latter machine at Mill Street by creating another reconstructed motor-generator out of two old engine-type generators, an 800-kw. alternator and an 850-kw. direct-current generator, still standing in the old Assiniboine steam plant. Three 833-kw. lowering transformers and a 22,000-volt cable from Mill Street supply the power.

This plan has been carried out accordingly, the substation building on Sherbrooke Street is now completed and the equipment is being installed in it. Two-wire operation, with the 800-kw. machine, has already been tried out from this station and has shown that the track potential along Portage Avenue from Sherbrooke Street to Portage and Main Streets, about 1 mile, can be reduced from about 12 volts to 2 volts, and that with three-wire operation the potential difference on this heavy line will be practically negligible.

The Logan Avenue substation has but one machine in it, and as there is no other motor-generator available to pair with it for enabling three-wire operation it was decided to extend the negative insulated return feeder system that had several years previously been installed there with a negative booster.

This station is to be fitted with a new arrangement of resistances in such a manner that the track in front of the station will be the point of lowest potential of the track system, which has not always been the case hitherto, due to faults in the original installation.

The three-wire system causes frequent reversals of stray current in underground cable sheaths in districts where the traffic is light. The scheme of cable drainage contemplates maintaining all present drainage connections into the substations. When circumstances require, it is proposed to use small negative boosters, or "suckers," of about 1-kw. capacity each with resistances in series, if needed, to assist in determining the inward direction of cable drainage current, subject to the approval of the Public Utilities Commission, which under the law has jurisdiction over the amount of drainage to be applied to all underground cables.

SPECIAL CONSIDERATIONS IN THREE-WIRE DISTRIBUTION

With the three-zone system of three-wire sectioning and only two machines in a substation, the positive machine is apt to be overloaded and the negative machine underloaded, when both are the same size or nearly so. It has been found necessary in several cases to vary the zoning arrangement to favor the substation machinery by dividing the load more evenly between the two machines. Several outlying suburban lines reaching into distant districts have their polarity reversed, on account of the sparseness of parallel underground structures, but it is likely that positive and negative zones will have to be alternated frequently on light lines just within the outskirts of the city.

In the case of the North End substation, the two machines are of the same size, 800-kw. each, and the load in the district is already about as much as the two machines can carry. Consequently it has been necessary to cut the district up into more than three zones of opposite polarity in each direction, so as to have the aggregate negative load more nearly equal to the aggregate positive load. This has worked very successfully, and the cable drainage current predominates inward.

DETAILS OF THE SECTION INSULATORS

The method of sectioning the trolley wire consists simply of placing two standard section insulators in series, with the adjacent tips only a few inches apart. There have been no accidents whatever to the overhead construction from accidental short circuit, either between trolley wires or feeders of opposite polarity. The only accidental occurrences chargeable to the three-wire system have been an occasional short circuit caused by careless platform men placing both trolley poles of double-ended cars against the trolley wire on opposite sides of a 1,200-volt breaker when turning cars, which happened in a very few instances when the central district of the city was changed to three-wire operation during the past summer. As the two breakers in series make a rigid spot in the trolley wire that causes the trolleys to wear out the breaker by pounding, it is probable that a single breaker with 16 in. of insulation will be gradually substituted for each pair.

Permanent potential wires are installed from all outlying extremities to the substation in each district, connecting to a permanent recording track potential voltmeter in the substation, from which charts can be taken at any time, thus enabling a constant check on the resulting distribution of track potentials to be made.

About 38 miles of No. 10 insulated weatherproof wire are required.

The regulation regarding track potentials is as follows:

> . . . the maximum potential difference between any two points one thousand (1,000) feet or less apart on said rails or other metallic conductors will not exceed one (1) volt, and further, so that the potential difference between any two points more than one thousand (1,000) feet apart on said rails or other metallic conductors will not exceed seven (7) volts, such maximum voltage drop *to be the mean value between the highest momentary peak and the average for the thirty minutes of maximum load*, but such track voltage requirements shall apply only on a business day and not to abnormal operating conditions brought about by fires, storms or the movement of crowds on holidays.

The above method of computing the average track voltage result is not Professor Ganz's, but was borrowed from the unofficial standard method of interpreting the British Board of Trade regulations used in England. A little study will show that the *legal* average of a fluctuating voltage curve will be higher than the real average, in the proportion that the momentary peak exceeds the real average. Therefore, the actual average must be brought below 7 volts, if the legal average is not to exceed 7 volts. This very rigid restriction is being met in Winnipeg by the three-wire system in a very remarkable degree, even before the system is completed.

Completion of the system, hitherto delayed by the inability of manufacturers promptly to deliver even the simplest details of electrical equipment, is looked for within a few months, and after the final adjustments have been made a more comprehensive record of results which have actually been accomplished will be available.

SUBSTATION CHANGES

The changes in substation connections were very simple. Fortunately, many of the machine panels were already provided with double-throw main switches, on account of the earliest installation of motor-generators having been designed to operate interchangeably with the railway circuits and with a commercial 500-volt power circuit, which is still maintained by the company. This fact was particularly helpful in working out the changes in the Mill Street substation, which is the largest and most centrally located.

The principal task in arranging this switchboard consisted in the addition of a new negative busbar and the installation of a heavy single-pole circuit breaker, which can connect the positive and negative buses by being closed when two-wire operation is desired.

The breaker is maintained open for three-wire operation. This general principle of bus connection is followed in all stations to connect and disconnect the positive and negative buses for changing from two-wire to three-wire operation.

The original internal connections of the machines themselves are not altered and the relation between the field and armature connections of the generators is not changed when the polarity of the machine is reversed. Usually the same machine is always run on the same side of the system. The same feeders are also maintained permanently at the same polarity in order to establish fixed conditions of automatic cable drainage.

Interlocks are being devised which will automatically prevent mistakes by substation operators in throwing machine and busbar switches when changing polarity.

The schedule of substation equipment under the new arrangement will be shown in table below:

Mill street	1—1,500-kw.	1—1,200-kw.	1—850-kw.	1—800-kw.,	4,350 kw.
Fort Rouge	1—1,000-kw.	1— 800-kw.			1,800 kw.
St. James	1—1,200-kw.	1—1.000-kw.			2,200 kw.
North End	2— 800-kw.				1,600 kw.
Logan	1—1,200-kw.				1,200 kw.
St. Boniface	2— 400-kw.				800 kw.
Sherbrooke	1—1,400-kw.	1— 800-kw.			2,200 kw.
				Total	14,150 kw.

Another feature of this installation, which will be added to it during the next few months, is a system of feeder-tie switches to be mounted on poles at the boundaries of adjoining feeding districts and worked by control wires from the nearest substation, so that some of the positive feeders and some of the negative ones may be used to interconnect the substations and operate the whole system in parallel on either the three-wire or two-wire system. This is intended to safeguard continuity of service on the three-wire system as much as possible in case of failures of machines in the substations; to permit three-wire operation of the whole system throughout the entire twenty-four hours (it being customary to shut down all but the Mill Street substation from midnight till morning), and to permit change-over to two-wire operation quickly if required in extreme emergencies.

The foregoing feeder rearrangement has so far been carried out without the purchase of any quantity of new feeder cable. Enough cable will be salvaged to provide whatever may be deemed advisable to supplement the trolley wires on several of the heaviest routes, to prevent overloading of the trolley wires, especially should one of the trolley wires happen to pull apart, which sometimes happens during the extreme cold winter weather. The total amount of feeder cable in use in the trolley distribution system in the city of Winnipeg is about 75 miles, of which about 20 miles is being taken down and re-erected to feed the new arrangement of positive and negative sections and to provide the above-mentioned system of tie feeders.

INVESTIGATION OF SELF-CORROSION

In all previous investigations and attempts at electrolysis mitigation in Winnipeg the peculiar chemical composition of the soil in and about the city had been ignored.

The deterioration and occasional complete destruction of underground structures, built of cement concrete, by the alkaline salts dissolved in the ground water has been so widespread in western Canada that the engineering profession has been compelled to recognize the risk run by all such structures and take steps to minimize it where possible. The general public is now aware of the continual jeopardy in which all buried concrete structures are placed, by virtue of being in soil containing a high content of soluble alkaline salts, which are mostly carbonates, sulphates and chlorides of magnesium, calcium and sodium, in combination.

The destruction of even the best concrete by these alkaline solutions in the soil led the writer to institute an investigation, with the aid of a professional chemist of high standing, to determine the effects of the contact of such solutions upon cast iron and lead, both with and without access of stray electric current.

The investigation is not yet complete, but enough work has been done in the laboratory and corroborated by examinations of buried pipes in areas where stray current does not exist to demonstrate that the customary attitude of blaming stray current from the railway for the widespread pipe corrosion in Winnipeg, under the existing soil conditions, is subject to considerable modification. The programme of the construction work necessary to achieve the reduced track potentials and gradients will not, however, be altered in any way by reason of this recently acquired knowledge of self-corrosion possibilities.

ORGANIZATION

The field work in the foregoing programme has been done by the construction force of the electrical department of the Winnipeg Electric Railway. The earlier part of the work of execution, comprising the design and construction of electrical details in Fort Rouge and the design of the electrical connections in St. Boniface substation, was begun by G. A. Mills, then electrical engineer, and brought to completion by Arthur Trott, electrical superintendent, who also had executive charge of designing and carrying out the details of all electrical switchboard changes at Mill Street, North End, St. Boniface and St. James stations and of all details of the new electrical equipment at the Sherbrooke substation.

The difficult task of changing over the railway switchboard at Mill Street substation from two-wire to three-wire was also laid out and executed by Mr. Trott, with the assistance of K. C. Ferguson. Their work also included the mechanical and electrical assembly of the reconstructed motor-generators. The trolley and feeder rearrangement was executed by O. W. Boyle, superintendent of electrical distribution. The mapping of the circuits and working up the details for their rearrangement, together with the large amount of field testing required to prove out results, were done by H. G. Stewart. To the interest, foresight and loyal co-operation shown by the entire organization is due the smoothness and the freedom from interruption of electrical operation during the transition period. The execution of field work not yet completed will be carried out by D. K. Lewis, recently appointed electrical engineer of the company.

The responsibility for the general conception, design and supervision of the entire scheme and for the engineering procedure throughout has been carried by the writer.

Illinois Utilities Hold Successful Joint Convention in Chicago

Papers and Discussion on Shop Personnel and Maintenance, Track Labor-Saving Devices and Automatic Substation Operation—Joint and Sectional Sessions Were Held Each Day, the Former Devoted to General and the Latter to Specialized Topics

FROM a railway standpoint, a very valuable and practical paper on automatic substation operation and the discussion that followed were outstanding features of a joint convention of the Illinois Electric Railways, Illinois Gas and Illinois State Electric Associations in Chicago on March 15 and 16. The joint meetings of the three associations were held during the forenoons, while separate simultaneous sessions were held each afternoon. At the opening session, on March 15, the joint meeting was addressed by W. M. Willett, president of the Gas Association, who referred to the significance of the joint convention. He said it demonstrated that the utility companies have recognized that the fundamental interests of these three utilities are one and the same. He considered this recognition in itself to be a great stride forward as it is only a short time since at least two of the organizations represented considered themselves competitors, and that the recognition of any virtue in one by the other would have been considered a sign of weakness. One of the happy results of the struggle for existence during the past few years has been the cementing together of these great lines of industry until today they are seeking co-operation. They are drawn together by a natural, logical and fundamental bond. The great work for the immediate future is to extend this period of co-operation and confidence to include the 7,000,000 customers served in the State.

In addition to the transaction of the business of the convention, the meeting was occupied for the remainder of the first morning by an address by John F. Gilchrist, vice-president Commonwealth Edison Company, Chicago, on the financing of public utility extensions through the sale of securities to the customers.

At the joint session on the second forenoon Charles H. Munroe and Martin J. Insull, presidents of the American Gas Association and National Electric Light Association respectively, addressed the meeting. Philip H. Gadsden, president of the American Electric Railway Association, was to have addressed the meeting, but was unable to be present.

Mr. Munroe spoke briefly on the work of the American Gas Association, with particular reference to the effort which had been made to bring about a basis of taxation that would remove the unfair advantage now obtaining for municipal bonds sold to cover the cost of public utility plants. He pointed out that because of the exemption of municipal bonds from the income tax, a big differential in favor of the municipal bond over private corporation bonds, though issued for the same identical property, is set up. He said that people who are in the upper register of the income tax and are required to pay back to the Government 73 per cent of their income are forced to buy tax-exempt bonds. Because of this situation, the bonds of the privately owned utility company would have to yield 22 per cent in order to be equivalent to a 6 per cent municipal bond. The Gas Association endeavored to secure the co-operation of the two other major utility associations in obtaining exemption of privately owned utility bonds from the income tax until such time as a constitutional amendment could be passed which would place a tax on municipal bonds representing utility plants. However, there was some feeling on the part of the other associations that this was not just the right way to go about it and the matter was dropped, to the regret of Mr. Munroe. He said, however, that Carter Glass had devised a scheme which would accomplish indirectly what his association had been unable to do directly. It is impossible to tax municipal property except by a constitutional amendment, but it is possible to tax the income from the operation of such municipal utilities. This, if carried out, would probably serve to remove the advantage municipal bonds now have over the privately owned utility bonds.

Mr. Insull spoke at some length of the work of the N. E. L. A., its service, engineering and publicity departments, and also of the success which has followed the geographical section reorganization of the association. He emphasized the point that excellence of service on the part of the utilities is the best means of creating and preserving good public relations.

A paper was also presented by W. L. Abbott, chief operating engineer Commonwealth Edison Company, on the broad subject of "The Consumers' Stewardship of the Coal Deposits."

PROCEEDINGS OF ELECTRIC RAILWAY SECTION

At the electric railway section meeting on the afternoon of March 15 M. J. Feron, general superintendent of transportation Chicago Elevated Railroads, read a paper which described the method of keeping a continuous traffic check on the elevated roads and North Shore Line. This paper appears in abstract elsewhere in this issue. In discussing Mr. Feron's paper, D. E. Parsons, general manager East St. Louis & Suburban Railway, East St. Louis, Mo., said that to an operating man in Illinois outside of Chicago Mr. Feron's paper was somewhat like a fairy story. He did not believe there is any property outside of Chicago requiring an organization for traffic survey alone. Most of the analyses are accomplished by observation of the number of passengers carried on the different divisions, either weekly or monthly, and in cases of unusual conditions, daily. He spoke of the difficult rush-hour problems in East St. Louis and said that while the regular and non-rush-hour schedules in East St. Louis are seldom changed, it is necessary to subject the rush-hour schedule to frequent and radical changes. Control of the service during the rush hour is nearly all done by observation through the supervisors in charge of the different divisions. The rush-hour service is augmented by trippers, which are regularly scheduled for a certain period of time each morning and afternoon, and extras, which do not run on any schedule but are under the supervision of the assistant superintendent of transportation. These extras are handled to the best advantage through agreement between the supervisor and the assistant superintendent as to how they will be operated on any particular day. Conferences are held about twice a week to determine the use of the extras.

In East St. Louis, where the different industries close at different hours, it is possible to use one car on as many as four routes during the evening rush hour, thereby getting the full benefit of each car and not allowing any layover of consequence at any particular point. The lines are generally of short haul and it is easy to handle the extra cars in this way.

About double the number of cars are required for rush-hour operation as are necessary for the non-rush-hour service. One route requires nine cars for the non-rush-hour schedule and twenty-two cars in the evening rush hour. On the stockyards division four cars are run during the non-rush-hour, while in 1920 it required twenty-six cars to give the rush-hour service.

Mr. Parsons also described the operation of the company in a community of about 25,000 people, in which the city cars serve as feeders to the interurban line which runs to St. Louis. Some years ago these cars were operated like taxicabs for the benefit of the residential patrons. For example, the motorman would ring his bell on the outbound trip to notify the patrons that he would be back in a little while, so they could hurry with their breakfasts, and the motorman would then stop in front of each patron's residence on the way back. This personal service had to be stopped, as there were cases where the motorman and a patron had some little difference and the former would refuse to stop in front of the patron's residence. This gave rise to some difficulty and it was necessary to change the regulations for stops at street intersections only.

J. M. Bosenbury read a paper on some aspects of shop personnel which appeared in the issue of the ELECTRIC RAILWAY JOURNAL for March 19, 1921. John Sutherland, master mechanic Tri-City Railway, Davenport, Iowa, discussed this paper at some length, telling of some of the shop practices followed by his company. He said that all rolling-stock is inspected and oiled on
a fifteen-day basis. During the war, when the comp
had 312 cars on the system and needed every on
them in service every night and morning, the shop
partment was given only seven hours each day in w
to take care of the inspection and maintenance w
For fourteen months all of the cars, almost with
exception, were in service every day.

Several questions were raised in regard to the fift
day inspection period. Mr. Sutherland explained
the use of slack adjusters, which had eliminated
men from the inspection force, and the oil wells in
modern motors made this fifteen-day inspection pe
possible. In addition to the fifteen-day inspection, ev
car is given a thorough overhaul once a year, whet
there is apparent need of it or not. This inspection
applies only to the cars used in city service. Th
average from 150 to 178 miles per day, and of the t
number eighty-four are equipped with modern mot
which Mr. Sutherland believed could run thirty d
without oiling if necessary. Questioned as to the k
of oil used, he explained that at the present time b
Standard and Texaco were being used and that this
the first year in ten that the company has not had
oil contract.

One of the factors in the excellent results obtai
with this infrequent inspection is that all beari
are renewed once a year whether or not this is need
All armature shafts have been made a standard
so that all bearings are interchangeable and are clam
in place instead of being held with a dowel pin.
good grade of wool waste is used and "teased up" ev
fifteen days when the new oil is put in. Mr. Sutherla
explained that he employed but one armature win
and a helper, and had 1,013 armatures on the proper
and that much outside repair work was done also.

Asked why he preferred the time basis to a milea
basis for inspection, Mr. Sutherland replied that
fifteen-day inspection period had been started ei
years ago and had been so successful that no chan
had been made, but he had no preference other th
this. In reply to further questioning, he said that
total cost for the maintenance of equipment amoun
to about 8 per cent of the gross, or from 2.9 to
cents per car-mile.

There was also some discussion about the efficien
of labor, and Mr. Sutherland explained that some ti
ago 40 per cent of the shop force was discharged a
that today the production is equal to what it was befo

STARTING THE NEW EMPLOYEE RIGHT

Following a paper on the consideration to be giv
the new employee, by W. R. Helton, Chicago Elevat
Railroads, which appears elsewhere, there was a ge
eral discussion of the difficulties and advantages
union labor in electric railway shops, particularly
to the wisdom of promoting union men to superviso
positions. The views taken were quite divergent, t
officials of the Chicago Elevated Railroads being qu
enthusiastic about the measure of co-operation whi
they had been able to obtain from union employe
although operating on the open-shop principle.

F. E. Fisher, general superintendent Chicago, Otta
& Peoria Railway, Joliet, Ill., said that the method
following up the employees recommended by Mr. Helt
was especially applicable where the size of the proper
was large enough to justify the employment of a pe
sonnel specialist and the necessary clerical force to ke
the records. On the small properties, however, the f

low-up work of the new employees falls to a large extent upon the foreman of each department through his daily association and contact. This makes it necessary to select the foremen with great care in order that the best results will be secured. In connection with this follow-up work, Mr. Fisher said that the holding of a school of instruction at frequent intervals for the different departments had been of great value. At these meetings matters of interest to the company and the employees of the department in session at the time are discussed by the heads of the departments, their foremen and the men, resulting in an efficiency through understanding and knowledge which far offsets the cost.

Mr. Fisher said that in his judgment the most important feature of starting off a new employee was, as Mr. Helton had stated, to instill in his mind a favorable impression of the company, his working conditions, the possible opportunity for advancement in his new field of labor, etc. If this is accomplished, the man becomes a satisfied and ambitious employee to start with, and if his efforts are given proper recognition the chances are that he will make a permanent and efficient employee. As evidence of the success attained along this line, he pointed out that the head of every department of his company was a man who had been connected with the company for a long term of years and had worked his way up through the ranks.

Mr. Fisher also commented that the follow-up on employees means more than just watching to see that the proper amount of work is performed in an efficient manner. It means that if an employee is apparently neglecting his work, or if his name is appearing too often on accident reports, something is wrong, that his mind is not on his work. Possibly some financial or family trouble is worrying him, and his foreman or immediate superior should be the first to notice this condition and at an opportune time approach him on the subject in such a manner as to secure his confidence and thus be in a position to help him out, thereby removing the possibility of an accident, or something worse. Co-operation between officials and employees is more than ordinarily necessary at this time in order to insure efficiency in operation.

APPLYING QUICK-TRAINING METHODS TO LINEMEN

At the second session of the electric railway association three papers which aroused a great deal of interest were presented. The first of these was by Theodore Blech, on the subject of "Graduating 'Mike' as a Lineman in Three Months"; the second by Charles H. Clark, on "Labor-Saving Devices of the Maintenance of Way Department and What They Save," followed by a three-reel motion picture showing the construction methods followed by the track department of the Cleveland Railway, and the third by Charles H. Jones, on the results of automatic substation operation. The first and third of these papers appear in abstract elsewhere in this issue. Mr. Clark's paper was abstracted in the March 19 issue.

In reply to questions on the special method of training linemen, Mr. Blech explained that after completing the course the new linemen are divided into classes A and B, while the old, experienced linemen are considered in class C, the three classes having different rates of pay. The class A and B linemen are considered qualified to work on "cold" lines, but they do not attempt to handle any live lines until after they have acquired actual experience in the work. The average age of the men secured to take the special training work has been twenty-one and one-half years. A good many of them are high school graduates who, it is expected, will make good additions to the engineering department later on. Mr. Blech explained that it was at first hard to interest the men in the work until it was pictured to them in the light of adventure, which has apparently been a successful appeal. The men were paid 55 cents an hour while going through the school at first, but this has now been reduced to 50 cents.

CLEVELAND CONSTRUCTION METHODS PICTURED

Considerable interest was manifest in the construction methods of the Cleveland Railway, and Mr. Clark was asked numerous detail questions, most of which have been covered in various articles in the ELECTRIC RAILWAY JOURNAL describing several phases of the track construction work in Cleveland. Summing up the total saving which has been accomplished through the extensive use of machines in this work, Mr. Clark said that since 1910 wages have increased 163 per cent, while the cost of the track construction work has increased but 40 per cent.

Speaking of the advantages of tilting the rail ¼-in. inward, Mr. Clark explained that this overcomes the need for tie rods, causes the wheel to fit the rail so that the wear takes place on the back instead of on the flange side, practically does away with corrugation and saves about 25 cents a foot. The rails are tilted by a special preparation of the steel ties used, which costs about 10 cents extra per tie. The concrete type of track construction is used practically everywhere in Cleveland, except on some short pieces of unimportant track, or where it is impossible to keep traffic off the track until the concrete can set. In these cases the track is tamped up on crushed stone, which is grouted in thoroughly, making practically a concrete construction.

In reply to a question Mr. Clark said that it is necessary to tamp the concrete under the steel ties in order to get a good bearing. Not only is the concrete tamped under the ties as poured, but it is tamped again about 50 ft. back from the pouring point, where it has begun to set. Asked about the standard use of high T-rail instead of girder rail in Cleveland, he called attention to the fact that this type of rail is now $5 less a ton than the girder rail. He closed his remarks by commenting that the Cleveland Railway was the first to reduce wages in the track department, a reduction from 50 cents to 40 cents an hour having been made.

S. J. Steiner, assistant engineer maintenance of way Aurora, Elgin & Chicago Railway, in discussing Mr. Clark's paper, commented that in interurban work the ditcher is an excellent labor-saving device, since it may be used for loading and unloading various materials as well as for doing its normal work of ditching and shoveling. He spoke also of the saving to be realized from treating ties and said that the number of renewals per year was only about 50 per cent as great with treated ties as with untreated.

C. B. Coates, Chicago Pneumatic Tool Company, spoke of the substantial saving which may be realized from the use of machines for track drilling and driving screw spikes. He described briefly improvements which have been made in the design of the motors used in this work by his company, whereby the free-running or no-load speed of the motors has been greatly reduced. This avoids the burning of drill points at the start and finish of a hole. He also mentioned the improvement brought about through the use of automatic resetting circuit breakers which avoids any possibility of burning out the motor, without involving delay and annoyance in resetting the circuit breaker. This feature is particularly advantageous when drilling high carbon steel rail. He also spoke of the readiness of the company to develop a dry-drilling tool if a sufficient demand develops.

DISCUSSION ON MR. JONES' SUBSTATION PAPER

A. P. Jenks, General Electric Company, Chicago, commented that the information brought out by Mr. Jones should carry considerable weight with the operating men as to the reliability and ruggedness of the automatic equipment. When the automatic control equipment for railway substations was first put on the market, most every one thought of it only in connection with interurban railroads, but its field of application is now considered practically unlimited. He said that in the future the large urban system will be the largest user of this type of equipment, replacing present hand-operated stations, since economies resulting will in most cases show a very handsome return on the investment, justifying the installation on a money-saving basis if for no other reason. It will also be used undoubtedly in an extensive way in connection with the electrification of steam railroads.

Mr. Jenks spoke of the extent to which automatic equipment has been employed and said that the General Electric Company has sold more than 100 equipments ranging in size from 300 to 2,600 kw. A very important installation is being made this year in Australia, consisting of eight 1,000-kw. substations for use in connection with the electrification of one of the steam railroad systems. An extensive installation of automatic equipment is also being installed by the Kansas City Power & Light Company on its Edison three-wire system. This will comprise five substations, four of which will contain two 1,500-kw. converters and the fifth a 2,600 and a 2,300-kw. machine and involve an investment of approximately $500,000. The automatic control equipment may now be considered as absolutely standard and the manufacturer is prepared to furnish it in capacities up to 5,000 kw.

E. J. Blair, assistant to the president Chicago Elevated Railways, emphasized the point that very good results may be obtained from putting automatic control equipment on old rotary converters, even though they may be of comparatively small capacity, locating them at points intermediate to the present substations. Because of the load-limiting resistances it is possible to keep the converter on the line during what would ordinarily be heavy overload conditions, and this makes it possible for the machine to be operated at a much better continuous load factor and thus enables one to "get away with" a 500-kw. machine where perhaps a 1,000-kw. unit would normally be specified on a new purchase.

S. A. Ralston, Rockford, Ill., and Edward Taylor, E. W. Allen and Hall Roosevelt of the General Electric Company, and Victor Thelin, Chicago Surface Lines, discussed Mr. Jones' paper. A prepared discussion by S. E. Johnson appears elsewhere in this issue. Mr. Roosevelt endeavored to show the members how to go about the rather involved economics of automatic substation installation on large city properties in determining the most economical layout of manual and automatic stations. Mr. Thelin told of the success which had been had on the Hammond, Whiting & East Chicago Railway with the installation of automatic reclosing circuit breakers at the end of a 30-mile section. The practice here is to depend upon a large substation for the main power supply, while a subsidiary station, in which the reclosing circuit breakers are installed, is started up in the morning, the breakers set, and then left all day without an attendant. This has produced a very substantial saving and involved no trouble thus far. Mr. Thelin expressed the view that it is highly desirable to have resistance in the main rotary converter circuit so that the machine will remain on the line under overload conditions for a reasonable time, but he considered it inadvisable to place resistance in the feeder circuits. His reasoning for this was that it is desirable that the feeder circuit breaker should be thrown out in case the line gets down on the rail, and remain out until the line gang can remove the trouble.

Ralph H. Rice, Board of Supervising Engineers, Chicago, commented briefly on how far the application of automatic equipment should be extended on large city systems and the economics of the number of substations. He said that in Chicago, with thirty-five substations, he thought that this was not a sufficiently large number to represent the most economical scheme. He raised the question of whether in such systems the full automatic equipment should be applied to substations or only certain of the automatic features, contending that where the power is practically never off, some of the automatic features may not be economically justifiable.

CONVENTION CLOSES WITH JOINT BANQUET

The joint banquet of the three associations, held on the evening of March 16, was very largely attended. Rufus C. Dawes, Chicago, acted as toastmaster. In his opening comments he made the point that the investment in the several public utilities is so very enormous that it would be impossible for the public to take on so huge a public debt. He considered it to be to the interest of the public and the investors that the utilities be kept in private ownership and operation, with a complete understanding between public and companies. The speakers at the banquet were the Hon. Ira P. Copley, United States Congressman from Aurora, Ill.; Charles A. Munroe, president American Gas Association; David Kinley, president University of Illinois, and David Gschwindt, president Illinois State Electric Association.

Making Continual Traffic Checks*

By M. J. FERON
General Superintendent of Transportation Chicago Elevated Railroads and C., N. S. & M. R.R.

DURING each twenty-four hours the Chicago Elevated Railroads operate a total of 2,584 trains and 8,661 cars, or an average of three and one-third cars per train, with a total of 191,000 car-miles per day. During the maximum evening rush hour, which is from 5 to 6 p.m., we carry 61,000 passengers out of the Loop District alone. To take care of the enormous peaks efficiently, we found it absolutely necessary to create a traffic survey organization, consisting of a superintendent of car service with the necessary assistants. The function of the traffic survey organization is the collection and compilation of information concerning traffic characteristics so that the officer in charge of operation will have such information as will lead to maximum operating efficiency.

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*Abstract of paper presented before Illinois Electric Railways Association in Chicago, March 15, 1921.

All our traffic data are collected in the field by men who have no other duties to perform. They are located on the different roads at points where passing trains have their maximum load, and they become very expert at collecting these data. The figures thus obtained are entered on forms and include the number of the first car on each train, the number of passengers in each car of the train and the branch of the road from which the train came or is going to, as the case may be. These data are collected continuously every day in the week, including Sundays, from 6 a.m. until midnight. A survey is taken of the traffic between midnight and 5 a.m., twice each month. After collection, these data are sent each day to the office of the superintendent of car service, where they are compiled and tabulated. The information is there transferred from the daily forms to a monthly form.

The purpose of this monthly form is to show the loading conditions of each train on the road at any time of the day or any day in the month, except for Saturday and Sunday. On these days an entirely different schedule is operated than on the other five days of the week, so that the records for Saturdays and Sundays are kept on separate forms.

These data furnish a picture of just what each train is doing day by day for the month. They also help in the preparation of new schedules. Memoranda are kept also of the weather conditions on each day.

In addition, the number of passengers passing through each station is registered. At heavy stations, readings of the register are taken every five minutes. A count is also taken at heavy transfer bridges.

PRACTICE ON NORTH SHORE LINE

The Chicago, North Shore & Milwaukee Railroad operates a total of 247 trains on week days and 266 trains on Sundays. On week days forty-four of these are limited trains, operating between Chicago and Milwaukee, thirty-two are express trains, operating between Waukegan, Ill., and Chicago, the remainder being local trains running between Evanston, Waukegan and Milwaukee, and between Lake Bluff and Area. On Sundays there are seventy-two trains between Chicago and Milwaukee, thirty-six each way. Of this number thirty-five are express trains between Chicago and Waukegan, and the others are local trains.

The car-miles run on this line are from 17,000 to 23,000 per day. The number of passengers varies from 30,000 to 38,000 on week days and from 38,000 to 45,000 on Saturdays and Sundays. On account of this variation it was found necessary to take a daily traffic survey of this business, but due to the length of the road, it was not practical to collect the data in the same manner as on the Elevated Lines. We therefore supply each conductor with a traffic report form, showing the names of thirteen important stations along the line. The conductor enters up the number of passengers on his train when leaving each station. He turns this card in at the office at the end of his trip with his cash report. These traffic cards are then checked to the number of passengers on the train at any point. The data are then transferred to a monthly sheet. The collection and tabulation of these data is considered one of the most important duties we have to perform.

Graduating "Mike" as a Lineman in Three Months*

BY THEODORE BLECH
District Superintendent Public Service Company of Northern Illinois, Waukegan, Ill.

THE demand for man power which has affected all industry since 1917 had a disastrous effect on the power stations. This was largely due to fixed rates and rising costs, and utilities could not keep step with wages offered by manufacturers. With the ranks of the utility companies becoming depleted, the writer advocated a radical departure from the traditional method of "making" linemen. The transition from a groundman to a lineman usually required from two to four years, as the position of a "hot" lineman was rightly considered a sacred one due to its impending risk and responsibility. It was this need for trained linemen which prompted the Public Service Company of Northern Illinois to put into action a plan of making a lineman out of "Mike" in three months. We were successful in Waukegan with this plan and now are well ahead with the third successive class of initiates.

Waukegan, located on Lake Michigan, is some forty miles north of Chicago and surrounded by a number of large industries. This district, of which the city is a part, known as District A, takes in about 400 square miles of Lake County, comprising about a dozen municipalities. There were four engineers in this district, who, together with the meter foreman and the line construction foreman, constitute the school "faculty."

When the linemen's school was first advertised common labor was paid $1 per hour. The young man of adventurous vein who wished to acquire good knowledge and a trade that insured him a permanent living was appealed to by two quarter-page advertisements. The newspaper editors gave us an interesting write-up. The response was surprising.

The applicants were addressed as a university would address prospective students. They were promised a three-month college course with the exception that they would be allowed a nominal wage to defray their expenses, with the understanding that upon graduation their rate would be adjusted to conform to the company's standard rate.

Generally speaking, the course comprised a daily lecture and quiz from 8 to 9:30 a.m. and thereafter practical training in the field. Lately there has been added a weekly evening course in which the elements of electricity are explained. This is open to all employees and particularly to the student lineman. The school is in charge of a line foreman who has had seventeen years of experience.

THE LECTURE CURRICULUM

In brief, the following is an outline of the lectures:

Mondays—A meter foreman elaborates the principle of the electric meter, not only from a theoretical but also from a practical standpoint. The meter foreman also teaches resuscitation by the "prone method."

Tuesdays—An engineer handles such subjects as the development of modern alternating current system; changes required by local conditions, such as changing to three-wire system, increasing size of conductors; use of step-down transformers; remodeling existing lines; work order and agreement sketches; Underwriters' Code; utilities rulings; transformer connections, external and internal, and discussion of problems submitted by students.

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*Abstract of paper presented before the Illinois Electric Railways Association, March 15, 1921.

Wednesdays—The district superintendent familiarizes the students with the complete network of transmission lines, explaining the difference in construction. Later he takes up the organization, and other various welfare functions, such as savings fund, pension system, safety organization, N. E. L. A. work and the Co-operative Council (organization of employees and management representatives) and, toward the end of the course, a complete review of the work done by all other teachers is made.

Thursdays—The assistant inspector teaches the principles of electricity, beginning with Ohm's law. He mostly confines himself to theory and carries on a quiz course which leaves every student carefully posted.

Fridays—The chief clerk dwells on the work done by other departments.

Saturdays—The line construction foreman takes up construction work following along the school's previous week's practical work, gives his viewpoints on good work and points to be avoided.

THE PRACTICAL WORK OF THE COURSE

The first day the students are taught the use of pliers and connectors. They are then taken out to the pole yards for the next two weeks. They set first a 20-ft. pole, which they are taught to climb, and then proceed to set six to eight 30-ft. poles which are cross-armed, anchored and wired, both for primary and secondary service. Then the whole line is dismantled and rebuilt.

The third week the class is taught how to hang, connect and remove a 1-kw. single-phase transformer. Later on a regular three-phase bank is installed. All of the above work is on "dead" lines and takes up about one month.

During this period every operation, whether it be climbing, handling of tools, making splices or repairing of cut lines, is drilled over and over again until every man does the work to the entire satisfaction of the foreman. The simple trick of throwing a handline between two wires is practiced until the students hardly ever throw wild.

Beginning with the second month the students start to work on the 220-volt secondary distribution lines. This gives them the first contact with live circuits. They run and repair services, repair secondary lines, straighten poles and pull up slack wires. Stress is put on thoroughness and not on speed, as the object is still training.

Upon completion of the course the men are transferred to the regular line gangs of other districts.

THE COST OF THIS TRAINING WORK

It is difficult to state definitely what the cost of a course has been. The only expense to consider is one month's wages, salary of the foreman and use of truck and driver. After the first month the crew is doing some maintenance work, and so becomes an asset instead of a liability. The truck is utilized mornings to haul freight to the storeroom while the class is attending lecture, thereby reducing the expense materially. The tools are furnished the men with the understanding that they become their property provided they remain in the company's employ six months after graduation.

During the six months ended Feb. 16, 1921, w graduated nine men who are now employed in othe districts and the present class is composed of seve men, six of whom will probably graduate.

This experiment is commended to the larger electri companies, where, it is believed, the results obtained wil be more far reaching and beneficial.

Introducing the Employee to the Job and Following Him Up*

BY WALTER R. HELTON

Manager Real Estate Department (formerly Employment Manager
Chicago Elevated Railroads.

THE law of first impressions applies forcibly to th man entering upon a new job. Care in directin the formation of these first impressions is rewarded b a state of mind of the man that makes for bette results.

This was illustrated in my own case, when a numbe of years ago, in following my trade in car building I secured a job at a car-building plant in Chicag Here so little attention was paid to my partner an myself in getting us started, and we had so muc trouble in finding the needed supplies, that we did no stay long. On the day we left nine other experience men did the same thing. This shop was advertising fo men every day.

Our next job was in the repair shop of one of th largest Eastern railroads, where, regardless of the fac that the work was all done out in the yard, we wer satisfied with the work mainly because the foreman an the master mechanic seemed to consider it a part o their job to get us nicely started. To this day th period of employment in that company's service i remembered as pleasant, and a feeling of friendlines exists toward that great railroad corporation.

Every man who enters upon a new job is to som extent handicapped more or less by what might b termed "stage fright," and anything said or done t remove that feeling will react in the man's more rapi attainment of efficiency. His first impression shoul be that he is more than a mere cog in a wheel. I addition to explanation of the detail of job a brie outline of the social activities of the employees, thei interest in the dances, club features, other entertainments, etc., will aid in arousing the interest of th new man and help him to feel that he is one of th family.

When the new man has his "feet on the ground" it is well to go after the production end, at which tim the allowances in bonus or other rewards should b carefully explained and demonstrated.

Often a man is left to his own resources after h has started work and is allowed to develop his own lin of training incidental to the particular job, shop o organization in which he is engaged. The result of thi is lower production, both in quantity and quality. A carefully planned, rigidly executed system of follow-u will invariably pay handsome returns for the time an expense incurred by having some one who is possesse of considerable tact.

The methods of initiation and follow-up as outline herein are not practiced in detail by the Chicago Elevated Railroads, although a great deal of progressiv work has been carried on in this direction by them.

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*Abstract of paper presented before the Illinois Electric Railways Association in Chicago, March 15, 1921.

Checking Up On Automatic Substation*

A Complete and Detailed Study of the Functioning of the Equipment in the Substations on the North Shore Line—Counters and Recording Instruments Were Used to Produce a Very Enlightening Record of Operations—Test Runs on Three Stations Show Their Efficiency and the Distribution of Losses

By CHARLES H. JONES
Chicago, North Shore & Milwaukee Railroad, Chicago, Ill.

IN ORDER to handle a very large increase in the business of the Chicago, North Shore & Milwaukee Railroad it became necessary in 1916 to make extensive additions to the power system as it then existed. It was adequate to handle the load of single-car operation, but with the advent of heavy train operation, passenger and freight, there was need for considerable improvement in the trolley voltage. There was on the system at this time 9,500 kw. in rotary converter and 3,000 kw. in step-up transformer capacity and there is now 14,500 kw. of rotary converter and 4,500 kw. of step-up transformer capacity, an increase of 52.6 per cent in converter capacity and 50 per cent increase in transformer capacity. With this equipment it is possible to handle approximately 100 per cent increase in alternating-current kilowatt-hours purchased. This is due to the fact that the new equipment was interspaced between the original substations, thereby reducing the amount of line loss and making available additional power for effective traction purposes. As shown in Table I, the total energy consumption per car-mile has been reduced from 5.78 to 4.31 kw.-hr. This reduction is due to a general improvement in operating efficiency, one of the factors of which is the substation interspacing but the exact amount for which this is responsible cannot be determined. The other figures in Table I will give a good idea of the rapid growth of the business of the company, and the graphic schedules reproduced herewith will show at a glance the service given for which power must be supplied.

TABLE I—GENERAL STATISTICS ON POWER CONSUMPTION TREND ON NORTH SHORE ROAD

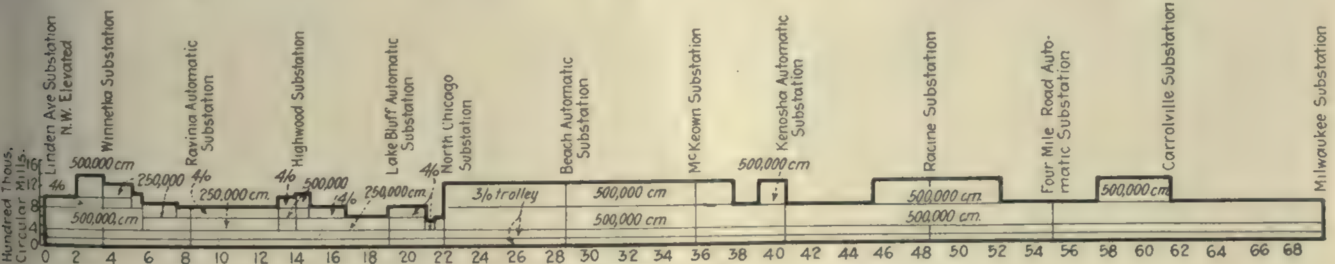
Year	—Car-Miles Operated— Passenger	Freight	Passengers Carried	A.C. Kw.-Hr. Used on Interurban System	A.C. Kw.-Hr per Car-Mile on Interurban System
1915	2,450,988	272,088	6,762,518	15,160,975	5.78
1916	2,830,317	348,320	7,459,689	17,892,122	5.83
1917	4,034,352	413,762	10,374,243	23,207,845	5.45
1918	5,355,632	517,744	11,875,249	28,481,021	5.05
1919	6,128,254	457,264	12,425,634	28,309,649	4.67
1920	7,074,419	887,399	13,388,238	29,314,722	4.31

LAKE BLUFF AUTOMATIC RAILWAY SUBSTATION, NORTH SHORE ROAD

Before this method of power development was entered into, consideration was given to raising the line voltage on part of the system to 1,200 volts, but this plan was abandoned on account of the excessive cost of changing car control equipment and old motor equipment. Consideration was also given to the installation of additional feeder copper, but this was also abandoned on account of the heavy cost. In an article published in the ELECTRIC RAILWAY JOURNAL of Jan. 11, 1919, I showed that it would cost approximately $650,000 to accomplish the same voltage betterment that has been made with interspaced substations, and fundamentally this would have been the wrong method of correction to apply. The existing feeder capacity is shown in an accompanying diagram, no change having been made since before 1916.

Power is purchased from two sources, which at times makes it necessary to do considerable high-tension switching from one power source to another, so that the automatic stations have had rather severe operating conditions.

Before going ahead with the installation of automatic substations, a careful study was made of installations already made at that time. Although our sub-



FEEDER CAPACITY DIAGRAM OF NORTH SHORE ROAD

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*Abstract of paper presented before Illinois Electric Railways Association in Chicago, March 16, 1921.

TABLE II—BEACH AUTOMATIC SUBSTATION OPERATIONS DURING JANUARY, 1921

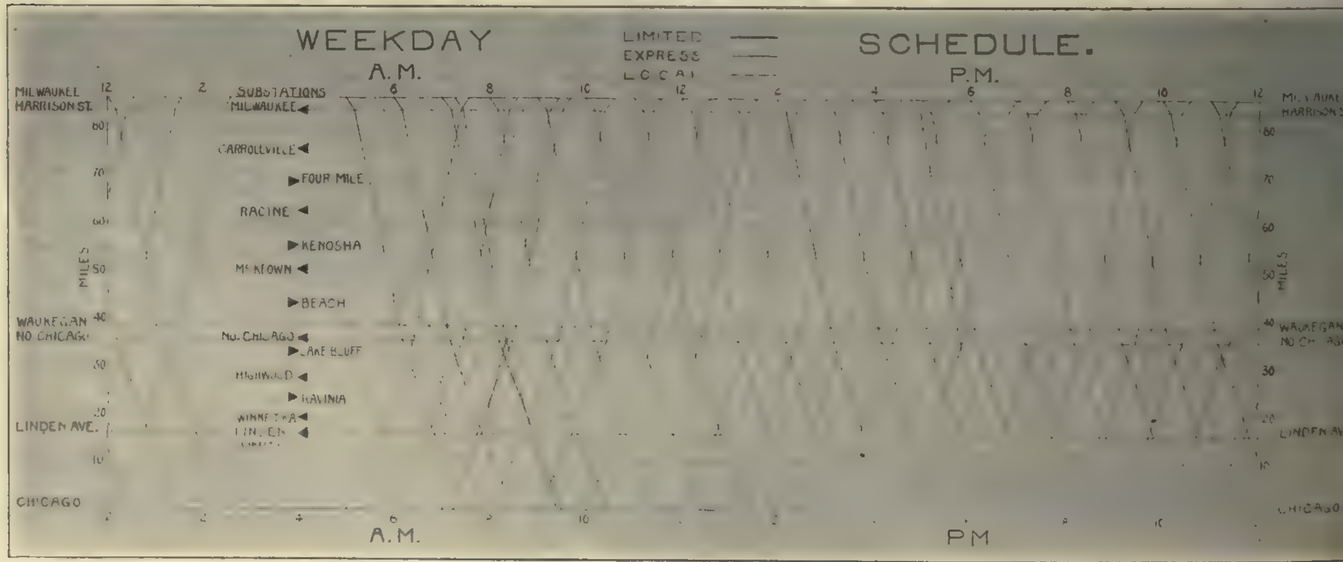
Day	Date	Hours Since Last Inspec'n	Hrs. Sta. Run Since Last Inspection	A.C. Kw.-Hr.	D.C. Kw.-Hr.	Number of Operations of Apparatus Since Last Inspection								Average per Hour		Remarks
						Controller	Oil Switch	Contactors 18	Contactors 20	Contactors 21	Relay 27A	Thermostats 19	Thermostats Res.	D.C. Kw.-Hr.	Operations of Station	
Saturday..........	1	25–00	18–30	6,625	5,570	21	21	21	50	17	0	0	0	301.1	0.84	
	2	24–00	18–45	6,670	5,610	14	14	14	82	32	0	0	0	299.2	0.583	
	3	23–00	17–30	6,835	5,750	21	21	21	82	64	2	2	0	328.2	0.915	
	4	24–00	17–15	6,045	5,070	21	21	21	65	33	0	0	0	294.0	0.875	
	5	24–00	17–00	5,575	4,670	18	18	18	53	39	0	0	0	274.1	0.75	
	6	24–00	16–45	5,470	4,570	16	16	16	44	14	0	0	0	273.0	0.667	
	7	24–00	17–15	5,510	4,610	16	16	16	49	15	0	0	0	267.5	0.667	
	8	24–00	18–15	5,785	4,830	17	17	17	36	41	1	0	1	264.7	0.708	
Sunday............	9	25–00	18–00	6,280	5,260	21	21	21	51	25	0	1	0	292.2	0.84	
	10	22–00	16–15	5,750	4,830	18	18	18	37	11	0	0	0	297.2	0.818	
	11	25–00	16–30	5,875	4,920	22	22	22	69	7	0	0	0	298.1	0.88	
	12	24–00	16–30	5,525	4,620	22	22	22	41	41	0	0	0	280.0	0.917	
	13	24–00	19–00	6,540	5,460	18	18	13	78	72	1	1	1	285.8	0.75	No. 18 contactor counters out of orde
	14	24–00	18–00	5,840	4,890	15	22	20	62	30	0	5	0	271.9	0.625	Oil switch counters out of order.
	15	24–00	17–00	5,875	4,930	18	22	18	50	59	2	0	1	290.0	0.75	Oil switch counters out of order.
Sunday............	16	25–00	20·15	7,415	6,240	10	23	10	54	20	0	0	0	308 1	0.40	Oil switch counters out of order.
	17	22–00	18–30	7,140	6,010	3	6	3	56	13	0	0	0	325 1	0.136	Oil switch counters out of order.
	18	25–00	18–30	6,530	5,470	13	25	13	57	46	2	13	0	295.9	0.52	Oil switch counters out of order.
	19	24–00	19–20	6,280	5,270	9	24	9	49	15	0	0	0	272.2	0.375	Oil switch counters out of order.
	20	26–30	21–00	7,445	6,250	12	20	12	53	77	3	0	0	297.8	0 453	Oil switch counters out of order.
	21	24–00	16–45	5,680	4,790	24	31	24	43	42	1	5	1	286.1	1.00	Oil switch counters out of order.
	22	21–30	14–10	4,355	3,660	19	19	19	43	56	2	0	1	258.2	0.883	
Sunday............	23	24–00	15–00	5,545	4,620	27	27	27	62	14	7	0	0	308.0	1.125	
	24	23–00	17–00	6,835	5,830	7	7	7	39	90	0	0	0	343.1	0 304	
	25	29–25	21–00	7,440	6,240	17	17	17	52	37	1	0	0	297.0	0.577	
	26	18–35	13–10	4,080	3,400	14	14	14	33	7	0	0	0	258.5	0.753	
	27	25–00	18–45	6,380	5,360	14	14	14	50	31	0	0	0	286 4	0.56	
	28	24–00	17–45	5,460	4,580	16	16	16	30	12	0	0	0	258.0	0.667	
	29	24–00	17–15	5,180	4,320	19	19	19	42	13	0	0	0	250.4	0.792	
Sunday............	30	25–00	17–30	5,830	4,900	22	22	22	32	8	0	0	0	280.0	0.88	
	31	22–00	16–30	5,375	4,510	20	20	20	24	12	0	0	0	273.4	0.909	
Totals................		743–00	544–55	187,170	157,040	524	593	524	1,568	993	22	27	5	8,915.2	21.919	
Average per day.......		23–58	17–35	6,037.7	5,065.8	16.9	19.1	16.9	50.6	32.03	0.71	0.87	0 16	287 5	0 707	

station erection has extended over almost four years, and other installations around the country have been carefully investigated, it has not been found advisable to change the design of building or the layout either on account of these investigations or on account of defects showing up in our own experience. A detail description of our substation design was published in the ELECTRIC RAILWAY JOURNAL in the issue already referred to. An exterior photograph of one of the substations and some interior views are shown herewith.

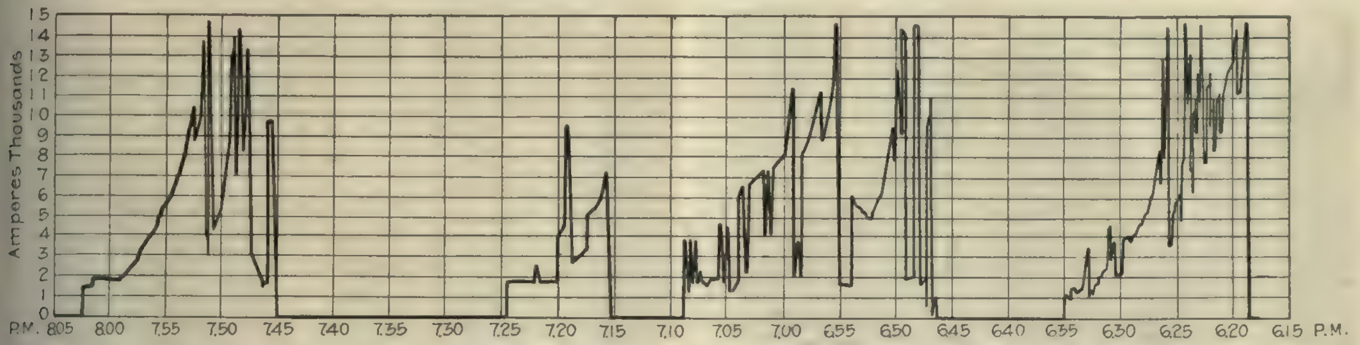
On account of the rapid growth of the load on our power system it was necessary to install the equipment in a temporary manner as hand-operated stations without waiting for delivery of the automatic control, and they were operated in this way while the installation of automatic equipment was being made. The first stations installed were those at Beach and Kenosha, followed by Four Mile, Lake Bluff, Libertyville and Ravinia; the last is just now being put in service. A of these stations are 25-cycle equipments except Ravini which is 60-cycle. All the 25-cycle stations are laid ou for 33,000-volt service, but some are temporaril operating on 13,200 volts. The 60-cycle station i supplied from a 20,000-volt line, with provisions fo 33,000-volt operation at some future date.

EXACT OPERATING DATA DESIRABLE

From the start it was apparent that it was ver desirable to know what occurred in the station betwee inspection periods. Accordingly, a number o mechanical counters were attached to various pieces o the apparatus in such a manner as to record th number of operations. This gave a very close chec on how the station was acting and up to a very shor time ago no other checking method was available. How ever, the General Electric Company has recently deve



GRAPHIC SCHEDULE OF NORTH SHORE ROAD FOR WEEKDAYS



TYPICAL TWO-HOUR RECORDING AMMETER CHART OF AUTOMATIC SUBSTATION

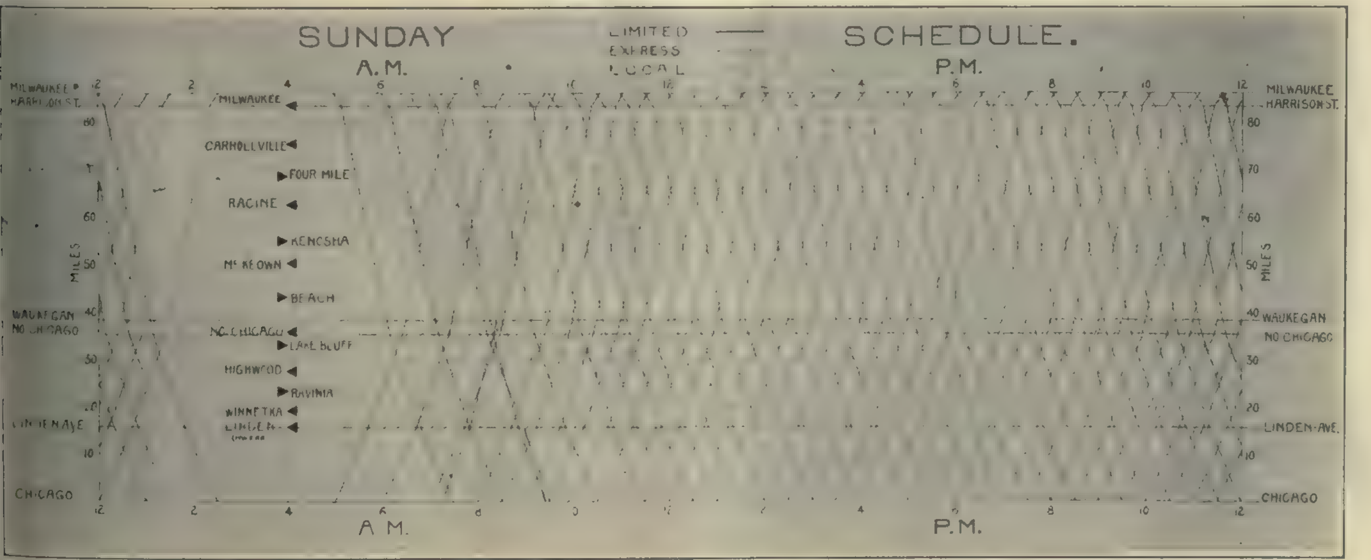
oped a recording instrument which gives a very complete record of station operation by means of an ammeter element and nineteen recording pens actuated by various pieces of the equipment, as shown in an accompanying illustration.

The inspector reads these various counters on daily inspection and enters them on a report card which is sent to the office and tabulated on a monthly sheet, Table II. In this way the various operations of the station can be followed from time to time. It was from records of this kind that the operating statistics of Table III were obtained. In addition to this record a log book is kept in each station in which these same readings are entered daily together with a report on all failures or unusual occurrences. A Bristol recording voltmeter chart is used for indicating station on and off the line and from this the time during which the machine is operating is calculated every day.

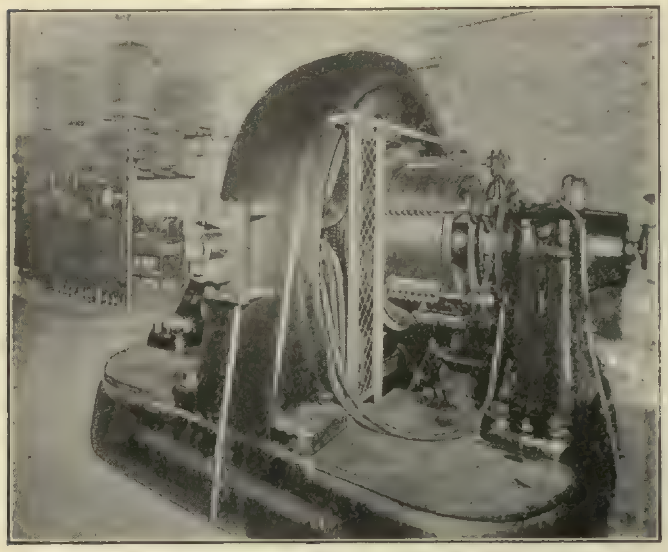
From this table it is quite apparent that the stations have been given a very severe tryout and if any serious defects existed they would have shown up by this time. On Kenosha station, which has made more than 33,000 operations since its installation, there has been no appreciable wear or excessive maintenance on any of the apparatus. In fact, the main contacts on which most of the wear occurs have never been removed, and from our experience up to date it is impossible to determine what the life will be or what the maintenance will amount to. As far as the number of operations are concerned, Kenosha station had had the equivalent of 22.7 years of service in a hand-operated station, assuming four operations per day in such a station. This means a corresponding heavy service on the balance of the equipment and the results speak very well for the correctness of design and ruggedness of equipment. The average load on the Beach and Kenosha substations is considerably higher than would be possible to obtain in hand-operated stations. This is due to the load-limiting resistances keeping down the momentary peaks, thereby making it possible to carry

TABLE III—AUTOMATIC SUBSTATION OPERATING STATISTICS

Station	Size Unit, Kw.	Date Started	Total D.C. Output to Jan., 1921	Total Hours Operated	Total Number of Operations	Total Operations of First Res. Contactor	Average Output per Operating Hour	Average No. of Station Operations per Day	Average Number of Operations of First Res. Contactor per day
4-mil	500	11– 2–18	1,948,600	9,712.8	24,709	9,298	200.6 Kw.	31.25	11.62
Kenosha	500	4–15–18	3,310,420	11,005	33,141	29,159	301.0	33.4	29.4
Beach	500	12– 5–17	4,926,745	16,854	21,562	56,387	292.0	19.4	50.2
Lake Bluff	1,000	2–26–19	3,782,030	11,726.8	7,196	8,520	323.0	10.65	12.6
Libertyville	300	12– 6–19	471,400	6,737	13,980	33,323	70.0	35.7	85.1



GRAPHIC SCHEDULE OF NORTH SHORE ROAD FOR SUNDAYS

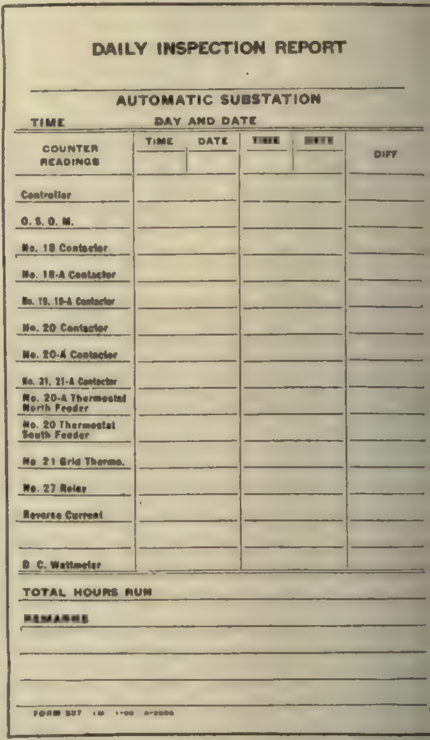


INTERIOR VIEW SHOWING LOCATION OF VARIOUS SUBSTATION EQUIPMENT

a considerably heavier load on automatic than on hand-operated stations. While this is a feature which could be applied to manual as well as automatic stations, it is nevertheless a regular feature of automatic equipment and this type of station should be given credit for it.

HOW MUCH INSPECTION IS NEEDED?

Among operators of this type of equipment there has been considerable controversy about the amount of inspection required and it has varied on different properties from daily to weekly. The amount required undoubtedly depends upon the load on the equipment, the reliability expected and seriousness of an occasional failure. From an inspection of our operating records, we believe that with as complicated apparatus as this, which performs so large a number of operations and where absolute reliability is required, a reasonable close inspection is needed. Hence we are of the opinion that daily inspection is about what is needed, when coupled with recorders which give an indication of what goes on between inspection periods. A typical section of a recording ammeter chart is shown in an accompanying illustration which indicates the character of load on a 500-kw. station. As the automatic substation design is only in its infancy, some failures were to be expected and some changes in design of apparatus required. But from a complete tabulation (Table IV) of these failures on the North Shore Road, it is quite evident that they have been comparatively few in number and of a minor nature. Since the causes have been located, a great many of these sources of trouble have been eliminated entirely. A summary of this tabulation shows that the failures per 1,000 operations of the various stations have been remarkably few. See Table V.



DAILY INSPECTION REPORT

AUTOMATIC SUBSTATION

TIME DAY AND DATE

COUNTER READINGS	TIME	DATE	TIME	DATE	DIFF
Controller					
O. S. O. M.					
No. 18 Contactor					
No. 18-A Contactor					
No. 19, 19-A Contactor					
No. 20 Contactor					
No. 20-A Contactor					
No. 21, 21-A Contactor					
No. 20-A Thermostat North Feeder					
No. 20 Thermostat South Feeder					
No. 21 Grid Thermo.					
No. 27 Relay					
Reverse Current					
D. C. Wattmeter					

TOTAL HOURS RUN

REMARKS

FORM OF DAILY INSPECTION REPORT USED ON NORTH SHORE ROAD

TABLE IV—RECORD OF FAILURES OF AUTOMATIC SUBSTATION EQUIPMENT ON C., N. S. & M. R.R. SINCE SUBSTATIONS WENT INTO SERVICE

Name of Apparatus	Nature of Trouble	Permanent Remedy Applied	Numbers of Failures Beach Substatio	Kenosha Substation	Four-Mile Substation	Lake Bluff, Substation	Libertyville Substation
Time delay cutout relay	Contacts burned	Redesigned relay head and substituted new contact metal	..	7	..	1	..
Time delay cutout relay	Coil burned out		..	1	1	1	..
Time delay cutout relay	Toggle failed to lock	Redesigned relay head	1	2	..	..	..
Time delay cutout relay	Out of adjustment		..	..	..	2	..
Instantaneous control relay	Open circuit		..	..	..	1	..
Instantaneous control relay	Resistance grounded		..	..	..	..	1
Instantaneous control relay	Chattering	New type relay substituted	..	..	..	..	1
Instantaneous control relay	Plunger stuck	New type relay substituted	..	..	1	2	..
Contact-making voltmeter	Stuck		1	..	..	..	..
Controller motor	Burned out		..	1	1	..	..
Controller motor	Commutator dirty		..	1	1	1	..
Controller	Poor contact of a segment		..	1	1	1	..
Controller	Brake stuck		..	..	..	..	1
Exciter	Polarity reversed		..	3	..	..	..
Resistance thermostat	Contact out of pivot	Thermostat redesigned	1	1	2	3	..
Resistance thermostat	Contact burned off		..	..	..	1	..
Oil switch	Motor burned out	Redesigned operating mechanism	..	2	1	..	..
Oil switch	Guide block broke	Redesigned block and fastening	2	3	..	..	..
Interlock on hand reset	Loose contact		..	..	..	4	..
Hand reset	Defective latch	Readjusted	..	6	..	..	..
Field relay	Screw loose on contacts		1	3	..	1	..
Field relay	Low voltage—would not close	Coil winding changed	..	..	1	1	2
Field relay	Grounded		..	..	1	..	..
Polarized relay	Poor contact	Contacts changed	..	2	1	..	..
Underload relay	Contacts burned	Contacts changed	..	3	..	..	1
Underload relay	Stuck open		..	..	..	..	4
A.C. no-voltage relay	Poor contact	Redesigned relay	1	1	1	..	..
Reverse-current relay	Burned out-lightning		..	..	1	..	..
Brush-lifting device	Coasting not enough or too far	Redesigned mechanism	..	..	..	24	..
Master relay	Poor contact		..	..	..	2	..
A.C. low-voltage relay	Resistance burned out		..	..	..	1	..
A.C. low-voltage relay	Broken lead		1	..	..	..	..
Load-limiting relay	Stuck		..	..	..	..	2
Load-limiting relay	Bad contacts		..	..	..	..	1
Controller motor contactor	Grounded		..	..	..	..	1
Field contactor	Burned contact		1	..	..	..	..
Totals			9	37	13	46	14

TABLE V—SUMMARY OF FAILURES

Station	Total Number of Operations	Total Number of Failures	Failures per 1,000 Operations
4-mile road	24,709	13	0.526
Kenosha	33,141	37	1.113
Beach	21,562	10	0.4638
Lake Bluff	7,196	46	6.392
Libertyville	13,980	13	0.929

The high average of one failure per 1,000 operations at the Lake Bluff substation, as shown in Table V, is due to defects which have developed in the brush-lifting device. These defects, however, have since been corrected, so that failure from this cause has been entirely eliminated.

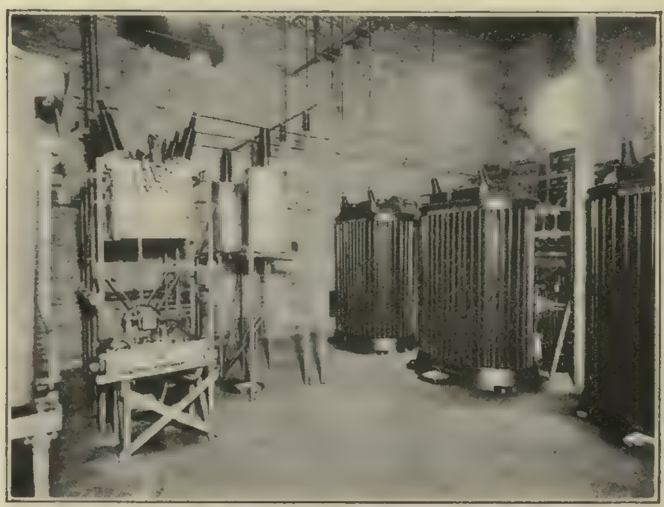
From Table IV it is apparent that of the 119 failures, the causes for seventy-four have been eliminated by redesigning pieces of apparatus. The remaining failures are of the usual class found in all complicated apparatus and these can be kept at a minimum only by careful inspection and maintenance.

THE FINAL ANALYSIS SHOWS A SAVING

The final test of whether or not the automatic substation is to remain depends upon its ability to make a reduction in operating expenses. On the North Shore line this has amounted to approximately $41,351 after charging against the station all legitimate charges such as inspection, interest and depreciation on equipment, and taking credit for elimination of station operating labor and idle running losses, but not for any portion of the reduced line losses. This saving has been made on 10.87 station years of service, or $3,804 per station year. Expressed on a basis of kilowatt-hours converted, this amounts to a reduction of 0.2863 cent per direct-current kilowatt-hour output.

RECENT TEST YIELDS VALUABLE DATA

We have just completed a very comprehensive series of tests of three of these stations in conjunction with the General Electric Company for the purpose of determining exactly the losses which occur in the stations, due to automatic operation. During these tests a great many interesting facts were found which have done considerable toward increasing our confidence in the equipment and the savings which they make possible.



ANOTHER INTERIOR VIEW SHOWING ARRANGEMENT OF SUBSTATION EQUIPMENT

Table VI contains a summary of a forty-eight-hour efficiency run made on each of the stations under test, which shows the efficiency of the stations and the distribution of losses in the various parts of the equipment.

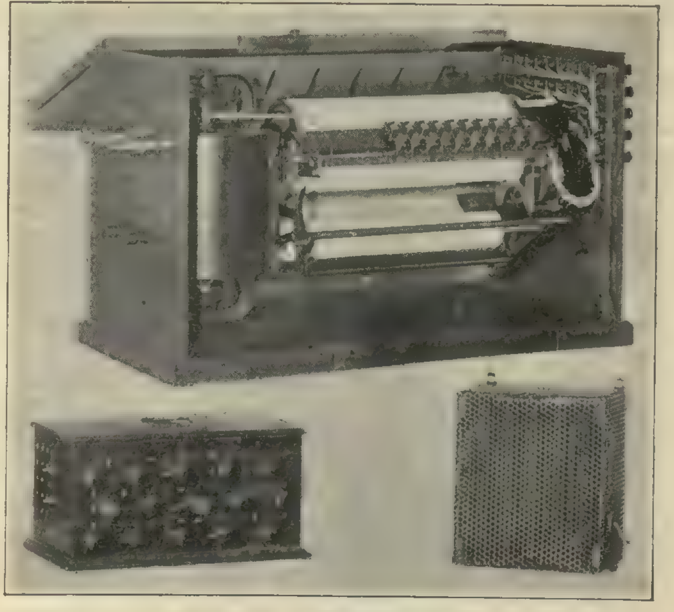
TABLE VI—SUMMARY OF 48-HOUR EFFICIENCY RUNS ON THREE SUBSTATIONS

	Kenosha	Lake Bluff	Libertyville
Capacity of converter	500 kw.	1,000 kw.	300 kw.
Total running time	1,271 min.	2,310 min.	2,219 min.
Running time, per cent of total run	44.2 %	80.3 %	77.0 %
Number of starts	69	4	26
Average length of running period	18.5 min.	9.6 hr.	1.4 hr.
Total input to station	7,536.7 kw.-hr.	16,080 kw.-hr.	4,108.5 kw.-hr.
Total output from station	6,130 kw.-hr.	14,218 kw.-hr.	3,200 kw.-hr.
Efficiency of station	81.5 %	88.5 %	78 %
Average load, per cent of machine rating	59.7 %	37.3 %	29 %
Time 1st resistor was in cir.	132 min.	19.3 min.	....
Time 2nd resistor was in cir.	23 min.	0.94 min.	....
Per cent converter output lost in resistors	2.2 %	0.48 %	0.2 %

Percentage Distribution of Input to Station:	Kenosha	Lake Bluff	Libertyville
Total output to trolley	81.5	88.5	78.0
Total consumed by resistors	1.86	0.43	0.16
Total consumed by A.C. control, operating	0.16	0.11	0.27
Total consumed by A.C. control shutdown	0.041	0.006	0.027
Total consumed by A.C. control starting	0.016	0.0006	0.011
Total consumed by A.C. control stopping	0.003	0.00009	0.02
I^2R and core losses of control transformer	0.11	0.07	0.30
Total consumed by No. 32 relay	0.01	0.02	0.05
Total consumed by D.C. control	.38	.36	.85
Total consumed by converter in starting and going on the line	1.04	0.02	0.34
Total losses in converter and power transformers	14.88	10.48	19.99

The automatic substation has been one of the greatest developments in the railway power field in recent years and its advent has made radical changes in power distribution engineering which are going to result in higher efficiency and better operating conditions on properties where it may be employed. Its field of application is practically unlimited, but the details of application and modification which may be required to suit certain localities are problems which must be studied and worked out for each location. On first consideration the automatic substation appears to be a very complicated piece of apparatus, but when we consider that it performs practically the same function as multiple-unit car control has done for years under much more severe conditions than exist in a substation there is no reason why it should not prove entirely satisfactory.

Our own experience has borne this out and we are very well satisfied with the results obtained.



AUTOMATIC RECORDING INSTRUMENT FOR MAKING RECORD OF AUTOMATIC SUBSTATION OPERATION

A. E. & C. Automatic Substation Experience[*]

By S. E. Johnson

Engineer Overhead Construction Aurora, Elgin & Chicago Railroad, Aurora, Ill.

MR. JONES' paper treats of a system where there is enough inspection work on the substations to warrant a crew of men for this work alone, and he has been able through his organization to compile data not only very valuable in the efficient operation of his own particular system but which can be used as a basis of calculation for other systems of like character. The follow-up system on causes of failures is especially interesting and valuable to other companies.

On the Aurora, Elgin and Chicago Railroad we have seven manually controlled substations and one automatically controlled. This station was originally manually controlled, but was changed over to automatic in September, 1918. It is located approximately 10 miles from the nearest hand-operated substation. An hourly schedule is operated both ways with trains consisting of one to three cars through the winter. During the summer months very heavy picnic service is operated on this branch, and these trains usually have about six cars.

SOME UNUSUALLY SEVERE OPERATING CONDITIONS

The service under which this station must operate during the summer months is very severe; I believe more severe than automatic substations were originally intended to serve. The starting current drawn by our particular car equipment is heavy and on account of the exceptionally long distance between substations, the automatic equipment must naturally take care of practically all of the current taken by trains until they are well away from the station. This made it necessary to set the thermostat on the line resistance grids so high that the grids would be at red heat before the machine would be cut off. By this means any cars in the vicinity of this substation are given power to move them regardless of overload.

When our station was placed in operation, the matter of regular inspection was given a great deal of study. A careful survey of the practice of other companies in this respect was made, and from the information gathered the period of inspection was found to range from daily to weekly, most companies, however, inspecting daily. We finally adopted the weekly inspection, partly because we had no organization to handle a more frequent inspection, and have followed it religiously since with very good results. In addition, we make an inspection after each electrical storm, though no difficulties have ever shown up. An operator who lives in the vicinity charges the lightning arresters, takes the meter readings and changes the recording voltmeter chart daily, but does no further inspection work.

This procedure soon brought us to the conclusion that we must know what was happening between inspection periods, and we soon developed and installed a special signal device that notifies the train dispatcher in case the station does not come in on the line properly when a demand requires it. This device has allowed us to forget about the automatic station between inspection periods. A record of the number of complete operations of the station is made by the use of a Bristo recording instrument. We have averaged one failur per 750 operations.

By the installation of automatic equipment at ou one station we were able to save $11.90 per day in labo alone, and I feel certain a considerable amount i repairs, which we are unable to check. The averag daily output has increased from 4,000 kw.-hr. per da to 6,500. This is due to the fact that under manua control a train starting at the station knocked out th breaker on the rotary and it was then impossible t close it again until the train was some distance away Under automatic operation, however, the load-limitin feature permits the station to furnish power to the trai continuously. Another advantage is that the service o this branch is improved, as we are able successfully t handle heavier trains under better voltage conditions.

The stations mentioned in Mr. Jones's paper operat a good many times per day, one in particular sixty-nin times. I believe that a station can operate too man times per day. In this particular instance, the statio perhaps operated five or six times per hour during rus periods, and if this is true, I believe it would be advisable to install a device that would hold the machine i on the line during this period and thus save the wea and tear of these additional stops and starts.

On our system we have a period between 1:30 a.m and 5:30 a.m. when there is no train service, but hav deemed it advisable to hold the station on the line wit a time clock to improve voltage conditions at our sho located about 5 miles away.

Automatic substations are now an accomplishmen and no longer an experiment. They are truly reliabl more so in fact than manually controlled stations, an they will show great economy right from the start.

City Bank on Trade Conditions

THE bulletin of the National City Bank for March 1921, has the following to say on what it calls "th great miscalculation which is tying up trade and industry at this time."

> Something has happened that has affected the buyin power of millions of people, and other millions are tryin to ignore it and think they can go on selling their ow goods or services at the same rates as before. Trade i dull and millions of people are out of work because the adjustments that are necessary to restore the equilibrium ar not made.
>
> Merchants refuse to reduce the prices of goods they hav in stock, and perhaps argue plausibly in justification of thei policy, but trade languishes and quicker witted competitor will replace their high cost goods with low cost ones an take the lead in the trade.
>
> Wage earners stand for the maintenance of wage scales and as the public is unable to buy goods made upon tha level of cost, the mills close down or run on half time, wit a great loss of wages, without corresponding reduction i the price of the product to consumers, most of whom ar wage earners.
>
> The printers of New York City wanted more wages las fall, and a committee of well-intentioned gentlemen selecte to arbitrate the case awarded an increase by some proces of reasoning which left the state of the printing busines and equilibrium between the printing business and the general business situation entirely out of account. The resul was that the wage increase, by increasing the cost of printing at a time when the public had less money to spend fo printing, aggravated the situation and resulted in a reduction of employment and of actual wage payment.
>
> That illustrates the whole situation. It is shortsighte to be always thinking that the wages can be fixed by simpl an agreement between employer and employees. There i a relationship between each industry and all the other industries which must be taken into account.

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[*] Abstract of written discussion on paper by C. H. Jones, abstracted above, read at meeting of Illinois Electric Railways Association, Chicago, Ill., March 16, 1921.

Profitable Conference of N.Y.E.R.A.

At the Quarterly Meeting Held in New York City on March 18 the New York Electric Railway Association Discussed Informally the Safety Car, Freight and Express Traffic and Valuation Matters—Inspirational Address Was Delivered by Homer L. Ferguson

INFORMALITY, frankness and a general willingness to contribute the results of experience were the characteristics of the twenty-fourth quarterly meeting of the New York Electric Railway Association, held at the Biltmore, New York City, March 18. The morning session was occupied by the reading of a paper on "Special Franchise Valuation" by L. R. Brown, engineer New York State Railways, Rochester, followed by an interesting discussion and a conference on "Solicitation of Electric Freight Business," opened by the reading of a contribution by T. H. Stoffel, Westinghouse Electric & Manufacturing Company.

At noon the members of the conference were entertained at luncheon by the association in a room adjoining the conference hall, after which the discussion was resumed with the one-man car as the focus of interest. No formal paper on this subject was presented. The program closed with an address on economic conditions and tendencies by Homer L. Ferguson, president Newport News Shipbuilding & Dry Dock Company, Newport News, Va.

Mr. Ferguson's remedy for the present condition of affairs is greater industry and economy in production, greater thrift and deflation of costs. Prices are not fixed by a mysterious influence, he declared, but by the laws of trade and finance. Waste and inefficiency in production must be removed. Overhead expenses should be reduced, companies must expect less profit and labor has to do its share in cost reduction, if this country is to meet world competition.

The usual evening banquet following the conference was omitted.

Mr. Brown's paper and the resulting discussion are abstracted below. A report of the remaining discussion will be given in a later issue.

Special Franchise Valuation

BY L. R. BROWN

Engineer New York State Railways, Rochester, N. Y.

THIS is an age of valuation. It is also an age of taxation. The two go hand in hand. The laws of New York State have for many years required each public service utility to submit each year a valuation of all its property, both real and personal, together with a report of gross receipts and operating expenses. The object is to furnish the state tax commission with information from which it can determine the value of the franchise.

Besides being of use to the state tax commission, this tax report furnishes an excellent opportunity for each company to make a valuable inventory and valuation of its property. For this purpose it should be very carefully prepared and revised each year. The electric railway companies of the State, especially the up-State companies, have not yet fully realized the importance and value of this report.

The tax commission at Albany is a very just and considerate one and has on its staff able engineers who are willing to give any company the best advice and aid in making the valuation as called for, and in compiling other information for the report. The commission allows each company to make its own valuation but insists that this be fair and reasonable. The commission advises that this valuation should approach original cost but recognizes the fact that most companies are unable to produce original cost figures and so has asked for "Cost to Reproduce New" and also for "Present Value Allowing Depreciation." By "Cost to Reproduce New" it appears that the commission means the cost to reproduce the property in its present condition but using unit costs that prevailed at the time the property was constructed, or at least using prices not inflated by the war.

The following is the "net earnings rule" which the commission applies to valuations and data submitted in the reports made by the various companies to determine the value of special franchises for tax purposes:

General Application.—From the gross receipts derived from the operation of the property deduct the operating expenses and a fair return upon the value of the tangible property, real and personal, necessary to the operation of the plant. The amount thus remaining should then be capitalized at a reasonable rate per cent to ascertain the intangible value which attaches to the operation. To this intangible value should be added the present value of the tangible property in the streets. The sum of this intangible value and the tangible value represents the value of the special franchise. This is a simple statement of the rule. Its application, however, requires some further elucidation.

1. The operating receipts should exclude all receipts that are not derived from the operation of the franchise; for example, the receipts derived from the operation of pleasure parks, sale of concessions, etc. Rents of lands and buildings not necessary to the operation of the franchise should also be excluded. In like manner the corresponding expenses in the conducting of these outside enterprises, which are dissociated from the operations under the franchise, should be excluded from the operating expenses.

2. The value which represents the investment in these outside enterprises should not be included in the value of the tangible property upon which the return under the rules is allowed.

3. The operating expenses should include taxes and a fair sum representing annual depreciation to a plant and equipment, which annual depreciation may not be covered by renewals and repairs during the year.

4. The rate of return to be properly employed must be determined upon the facts governing the degree of hazard or reasonable confidence in the enterprise, not being based upon speculation but upon the facts as demonstrated in the conducting of the business.

5. The rate per cent used for capitalization is usually assumed at 1 per cent rate higher than the rate of return, to compensate or allow for the uncertain circumstances which may be involved in the general question of appraisal.

6. If the nature of the business conducted is of such a character as to require an unusual amount of cash to be kept on hand as representing a working capital and therefore not available for investment or for dividends, it is proper that a reasonable amount of cash working capital should be included in the amount upon which the return is allowed. The amount of such cash must, of course, be determined by experience and knowledge of the actual requirement of cash for that purpose.

7. In determining the value of the tangible property, development expenses are not to be included, neither is the expenditure for paving, which attaches to the first cost of the installation of the plant to be considered a part of the value of the tangible property, although the amount which is actually expended for paving may rightfully be included in the amount upon which the return is allowed. However, after the intangible value has been determined, the item representing the cost of paving is not to be included in the value of the tangible property in the streets when the value of this tangible property is added to the intangible value to give the amount representing the value of the special franchise.

8. The intangible value attaching to the property as a whole having been determined, a proper apportionment of that intangible value must then be made as between that part of the intangible value which attaches to the operations in the streets and highways and that part of the intangible value which should be fairly attributed to the operations upon private right of way. The most equitable apportionment of such intangible value is necessarily upon the basis of per cent of gross receipts derived from the operations in the streets and highways and the per cent of such gross receipts as is derived from the operations upon private right of way.

9. The proper intangible value attributable to the special franchises having thus been ascertained, a still further apportionment of this intangible value must be made between the different tax districts where the property used in connection with the franchise is represented in more than one tax district. This apportionment between districts should also be made upon the basis of gross receipts derived from the operation in each tax district.

10. The value of the tangible property used in connection with the special franchise must, of course, be ascertained for each tax district and the value of such tangible property be added to the intangible value ascertained for that tax district to form the special franchise valuations for a particular tax district.

11. It frequently occurs that there are circumstances and conditions which may be peculiar to any one property, such as burdens upon the franchise imposed by the authorities who grant the franchise, as well as other circumstances and conditions surrounding the property which must be considered in connection with the application of the rule. The net earnings rule must, therefore, be applied with great care and must be employed with sufficient elasticity and judgment as will insure a fair and equitable determination of the value of the franchise.

An important fact concerning the application of the rule is that the net earnings used are the average net earnings over a period of five years and not the net earnings for the current year. This method avoids any great variation in franchise valuations and taxes, because the net income which is bound to fluctuate is the main determining factor in computing the franchise valuation under the rule.

Valuation for tax purposes is entirely different from valuation for rate-making purposes, and the two should not be confused. For tax purposes, the commission wants a stable valuation using unit prices ranging over a considerable period of time so as to represent as nearly as possible the investment cost of the property. The values furnished to the state tax commission by the companies should not include intangibles, for these are taken care of by the intangible value computed by the commission from the net earnings. Valuations for rate-making purposes on the other hand have been generally recognized to include certain intangible values such as "going concern" and "cost of financing." The proper basis of unit prices to use on a valuation for rate-making purposes apparently has never been definitely decided upon but it seems logical to assume that a company be permitted to earn a fair return on a valuation based on prices obtaining over the period of time during which the rates are in force. Thus it will be seen that valuation for tax purposes and for rate purposes are two very different propositions.

In 1917 the New York State Railways had an appraisal made of its property on a "cost-to-reproduce-new" basis using pre-war prices, most of which were based on a price trend extending over a period of ten years or more. The New York State Railways are a consolidation of some fifty original companies for most of which there are no cost construction data. Not only that but a considerable amount of the property has been reconstructed since the original construction. This valuation made by a competent engineering firm formed the only basis to indicate the real worth of the property. It also gave the company for the first time what was really its actual value.

The value of the property, which had been reported to the state tax commission each year, was considerably less than the new appraisal value even when the intangibles were not considered. Realizing this a meeting of the officials of the company was called and it was decided that in fairness to themselves and to the public the values in the tax report should be changed to agree with the appraisal of the property even though it might mean an increase in the taxes paid by the company. No intangibles were included in the tax report but the values included items of overhead covering such costs as legal expenses and interest and taxes during construction.

To show the reasonableness of the prices used in the appraisal and subsequently in the tax report, several of the principal elements are here listed:

Girder rail per ton	$39.60	Copper base per pound	$0 18
T-rail per ton	30.40	Concrete per cubic yard	3 27
Untreated wood ties each	0.67	Common labor (city), per hour	0.20
Yellow pine lumber, per M.ft.	42.75	Common labor (interurban), per hour	0.18
Steel shapes per ton	28.80		
Brick pavement per sq.yd.	2.30		

Using these unit prices one mile of standard track construction without pavement and consisting of 7-in plain girder rail, wood ties and crushed stone ballas cost about $28,000. This included about 35 per cent o tangible overhead which was added to the field costs.

When these figures were submitted to the state ta commission in March, 1918, they reasoned that it woul be unfair to increase the New York State Railway valuation when the values that had been previousl submitted were already as high as those submitted b other electric railways in New York State. At the suggestion of the commission, the New York State Railway are this year reducing the tangible overhead costs from 35 per cent to 20 per cent of the field costs, but the cos per mile will still be higher than the other roads o the state. Unit prices of material given on the report of other companies agreed very closely with those o the New York State Railways. Discrepancies wer found to be due to the very small labor costs for excavation and grading and for track laying and surfacing. Figures of thirty cents per foot of single trac were used in some cases for track laying and surfacin in city streets. Another reason other companies reported lower figures than the New York State Railway was because they had entirely omitted such field cost as tools and construction appliances, superintendenc and field accounting, inspection, liability insurance, contingencies and omissions. Likewise they had omitte altogether or used very small percentages to cover overhead costs such as legal and administration expenses an interest and taxes during construction.

A careful study of the net earnings rule of the stat tax commission shows that an increase of valuation on the tax report does not necessarily increase the franchise valuation. Whether it is increased or decreased depends upon the relation of the "Present Value Allowing Depreciation" of the property to the net earnings. If the net earnings are very small, say almost zero for a period of five years, then the intangible value as computed according to the net earnings rule would be zero. In this case the franchise value would equal the "present value" as reported on the tax report and any increase of the one would increase the other. On the other hand, if the net earnings were reasonably large and the valuation small, then an increase in values on the tax report would increase the allowable return and thus reduce the net earnings. This would decrease the intangible value of the property which when added to the tangible property according to this rule might give a franchise value less than before. Generally speaking, a change in the value of the property on the tax report will have but little effect on the franchise value for what is gained or lost on the tangible will be offset by a loss or gain on the intangible if the net earnings rule is rigidly applied.

If to increase the values on the tax report to a reasonable figure would have very little effect upon the taxes it would seem good policy for the electric railways to revise their tax valuations. Would the electric railways of the state be willing to accept a fair rate of return on the value of their property as they themselves report it to the state tax commission? Can the companies reproduce their lines new for anywhere near the amount reported on their tax reports even with unit prices prevailing ten years ago? Why should not the electric railways of the state get together on this proposition and report fair increases in their taxes?

DISCUSSION OF MR. BROWN'S PAPER

The discussion on the above paper included three distinct items: (1) Valuations on a reproduction basis, (2) franchise tax as compared with a gross earnings tax and (3) paving requirements.

It was said that the franchise tax now assessed is a more favorable method of taxation than the gross earnings tax, which even if only 1 per cent would in many cases figure about the same as is now being paid by most companies in New York. If it were 2 per cent the amount would be more except in the case of the Interborough.

As things are now, the tax commission uses some discretion in cases where companies cannot meet the assessments and has only recently granted the Brooklyn Rapid Transit Company a $10,000,000 reduction in the value of its franchises. Under the gross earnings tax there could not have been any such relief. The real trouble with the franchise tax is in its administration. The tax itself is satisfactory. The companies which feel they should have a reduction in this tax should send their operating men to explain the facts to the commission and not depend upon a lawyer for this purpose.

It was further pointed out that in the valuations submitted to the tax commission care should be taken to see that only such property as is actually in service is included. Deductions should be made for obsolete equipment and also for power plants, when power is purchased. In figuring depreciation, the straight-line method should be used and full information covering such deduction should be attached to the report. In figuring property value the commission has to work on an average per mile of track and if companies figure too low or too high, such an average is affected according to the method of weighting used.

The need of valuations has been overlooked in the past, but it must be borne in mind that valuations for taxation, rate making and issuance of securities differ, due not to the inventory but to the inclusion of various "overheads," depending upon the purpose for which the valuation is made.

Figures for the value of railway property should be kept by the railway and the tax commission in a uniform manner, first according to the Public Service Commission allocation of accounts and then subdivided further according to municipalities through which the railway operates.

PAVING REQUIREMENTS

Paving requirements under the present law compel the street railway to pave and maintain between its tracks and for 2 ft. on either side. In the discussion these requirements were held to be unfair, as there is no valid argument why a railway should lay pavement only to have this worn out by others. The rails in the streets are really of advantage to a community, for heavy trucking can track these rails. Then, too, in winter with snow on the ground they provide a highway, while at other times the parking of vehicles at the sides of the street drives the traffic onto the railway strip. Two bills on paving are now before the State Legislature, one of which repeals the present law, while the other makes it more onerous. The paving situation, especially along state highways, should be, it was said, under a new commission, and the present law repealed. If the actual facts could be presented to the Legislature, some relief, it was believed, might be obtained, and it was voted to refer the whole subject of paving to the association's legislative committee.

Attention was also directed to a bill now before the Legislature, which, while only applying specifically to the Borough of Queens, might after passage be construed to apply elsewhere. This bill gives the local authorities in Queens the right to compel relocation of tracks even though the railways had laid their rails where ordered by previous municipal authorities. The reason for this is the refusal of the New York & Queens County Railway to change from an unpaved side location to a paved center location on a street that was being improved with paving.

A speaker asked if it was possible for the State highway maintenance tax to be saddled upon the trolley lines by the various municipalities. It was held to be a legal matter and attention was called to the bill now before the Legislature which, while it was believed to be unconstitutional, would allow this maintenance tax assessment to be passed along to the railway the same as any other assessment.

In Massachusetts, it was brought out, the law requiring the railways to pave between the tracks and outside had been repealed. The railways now maintain pavements only where it is so specified in their original franchises. As for changes in grade, location, etc., required due to state highway construction or reconstruction all such expenses are borne by the state except the renewal of ties, rails, etc. The railway company usually does its own work and renders bills for the proportion to be paid by the highway commission.

New England Outlook Is Bright

Speakers at Club Meeting Refer to Better Conditions—Governor Cox Elected Honorary Member of New England Club

THE twenty-first annual meeting and banquet of the New England Street Railway Club were held on Tuesday of this week at the Copley-Plaza Hotel, Boston. Edward Dana, general manager Boston Elevated Railway, was elected president of the club for the coming year. The other officers chosen were: Vice-presidents Ralph D. Hood, Haverhill, Mass.; W. J. Flickinger, New Haven, Conn.; T. H. Kendrigan, Manchester, N. H.; T. B. Jones, Burlington, Vt.; Alfred Sweeney, Lewiston, Me., and Walter C. Slade, Providence, R. I.; secretary, John W. Belling; treasurer, Fred F. Stockwell; members of executive committee, I. A. May, C. H. Wood, W. W. Field, F. B. Walker, L. P. Morris, A. A. Hale and L. D. Pellissier.

There were about 400 guests at the banquet in the evening. I. A. May, retiring president, presided and introduced his successor, Mr. Dana, who after expressing his appreciation of the honor of election said he wished to be of service to the club and pledged his best efforts throughout the coming year. Continuing he said:

"If I lived in the past I would fancy myself arguing before the old Public Service Commission about plans which would save money and still give better service, and waiting months for a decision, instead of presenting facts to a Board of Public Trustees who act promptly and get results.

"The members of this club have been a credit to the industry during its years of uphill fight and now that the future promises to be so bright I know that I will have the co-operation of every single member (and some new ones also) in the effort to make the record of this year one of continued progress and greater results."

The assets of the club were reported by President May as $4,000, including more than $3,000 in cash.

The toastmaster was Alonzo R. Williams, general counsel Rhode Island Company, Providence, and a descendant of Roger Williams, who was referred to as a pioneer in interstate commerce. Mr. Williams gave a humorous account of the qualifications of a railway attorney and was very happy in his presentations of the other speakers. At the conclusion of his introduction of Governor Cox of Massachusetts, the Governor, on motion of Ralph D. Hood, was unanimously elected an honorary member of the club. The only other honorary member of the club is Past-President William H. Taft.

Governor Cox expressed his pleasure at this election and also at the note of optimism in Mr. Dana's address. Too often today, he said, we hear predictions of failure and despair, but in his opinion there are just as great opportunities today as ever for those who are willing to give service.

Mayor Andrew J. Peters of Boston, who spoke next, voiced the thought that there is now a clearer understanding by municipalities of the needs and possibilities of service of local transportation companies, and he declared that no contract between two such organizations can be successful unless it is to the advantage of both sides.

Senator S. P. Spencer of Missouri, the next speaker, referred to the difficulties which the electric railway industry had experienced during the last few years and to the recognition by the Federal Electric Railways Commission of the essential nature of the service and the need for a sympathetic understanding of the problems of the industry by the public. He then discussec pending immigration legislation.

The toastmaster then called upon Arthur Gaboury superintendent Montreal Tramways. Mr. Gaboury referred to the visit of the club to Montreal last Jun and suggested that the club this summer might lik to go to Quebec, visiting Montreal on the way. Th meeting closed with a vote of thanks to the speakers proposed by President May.

Is Public Ownership Inevitable?

THE principal speaker at the meeting of the Philadelphia section of the American Society of Civi Engineers, held on March 7, was William S. Twining director of city transit, Philadelphia. While the addres related in part to the local transit situation, the speake took the occasion to outline the results of his broa study of the subject of urban transportation in genera and its relation to municipal government as at presen constituted. Mr. Twining said that although he ha been considered by some as favoring municipal suppl of transit service, he does not favor this under presen form of governmental administration, but he believe that because of certain conditions which he outlined public ownership is inevitable in large cities. Service at cost he considers, is simply disguised public ownership an operation, for the private corporation under such conditions is no longer a free corporate agent, but a de fact agent of the public. The service-at-cost plan is simpl a halfway station on the road to public ownership an operation, a temporary expedient aiming to utilize existing machinery for transit service while governmenta machinery is being evolved.

According to Mr. Twining history shows that transi development is proceeding in three fairly well-define stages, as follows: The first was the era when transportation was considered a private business with whic government had little or no concern; the second stag was inaugurated when transit service began to be regarded as a semi-public business, as it is regarded toda The third and final stage, only recently entered upo is that of its universal recognition as a public busines and function of government. Today transit service i in an unsettled condition principally because of th conflicting opinions as to its nature. Paraphrasin Lincoln, transit service cannot exist half governmen and half industry. The public would not countenanc any proposal to abolish governmental control, so tha the only alternative is full public ownership in the sup ply of the service as a branch of municipal activity.

Under the Public Service Company laws of Pennsylvania, for instance, the state assumes responsibilit for the quality of the service to be rendered by the corporation and determines what are reasonable rates fo the service, so that the management to all intents an purposes is state management. But if the capital use in public service is practically placed under the care o the state and all business risk disappears, the necessit for stockholders also disappears. If with commissio regulation, we must submit to all the disadvantages o public management, complicated by functioning throug corporate officials, why not simplify the relationship b having public management function direct?

Mr. Twining thinks also that the report of the Feder Electric Railways Commission is pessimistic as to th continuance for long of private ownership.

Safety of Passengers in Steel Cars*

Analysis of a Large Number of Accidents to Cars Shows that Their Superstructures Should Be Strengthened—Wire Cables Appear to Offer an Effective Means of Arresting Progress of an Invading Car Before It Penetrates Far Into the Structure

By FRANK M. BRINCKERHOFF
Consulting Engineer, New York City

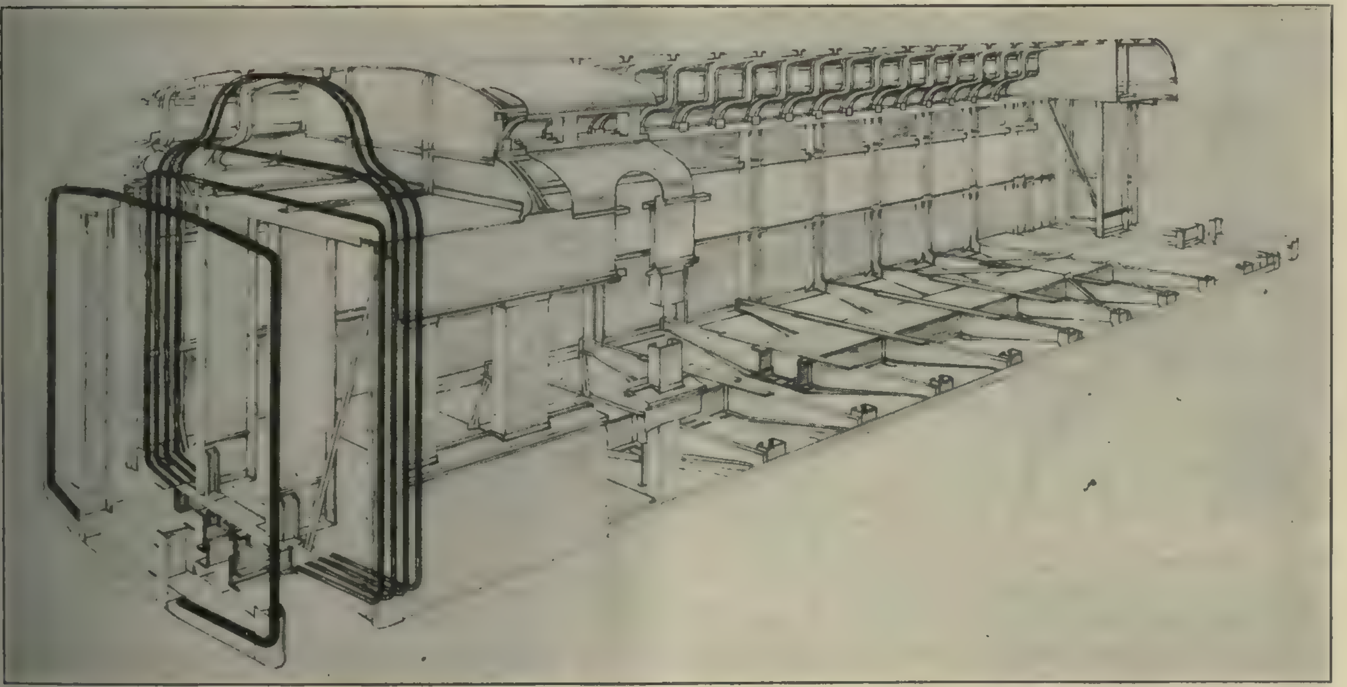
THE general adoption of steel in place of wood in the construction of passenger train cars some fifteen years ago marked a distinct advance in the art of car building. Various problems arose during the change, and many have been successfully met. The two most important problems to be solved were and still are safety of passengers and weight of complete car.

That some steel passenger cars are heavier than the wooden ones which they displace in service seems to be indicated by the significant fact that the adoption of steel passenger-train cars was frequently accompanied or closely followed by the purchase of heavier locomotives to handle the new passenger equipment.

With regard to the problem of safety of passengers, I wish to give in condensed form the results of an extended investigation of the behavior of passenger train cars when derailed or in collision and to point out that, while the steel structure affords much greater safety to passengers than did wooden car bodies, modifications can be made in the superstructure of steel cars which will greatly increase their ability to resist destructive shock.

It was natural that the early design of steel car structures should follow conventional lines and that the evolution from the all-wood car to the all-steel car should be gradual. It is now possible, however, to examine the photographic records of typical accidents to passenger trains and profit by past experience when designing and building new equipment.

Examination of many illustrations of accidents of the derailment and sidewiping class soon led us to the conclusion that distribution of metal which would strengthen the superstructure of the car as compared to the strength of the underframe was highly desirable.



PERSPECTIVE VIEW OF CAR FRAMEWORK, SHOWING PROPOSED ARRANGEMENT OF CABLES FASTENED TO CENTER SILL

During the last ten years or more, 315 cars have been built according to a system evolved by us, with the purpose constantly in mind to produce a car body structure of great strength but still of a weight not in excess of wooden car bodies of similar size and equipment. The side-frame members of these cars are organized in the form of a girder extending from the side sill to the side plate at the roof line, a height of 7 ft. 6 in. or more. The underframe of this system includes center sills adequate to sustain the shocks of collision, draft, etc., but instead of being of the fish-belly type designed to be self-supporting between truck centers, as is the usual custom, the center sills of this system are uniform in section throughout their length and are supported approximately every 6 ft. by heavy cross-bearers between the high girder side frames. The center sills, being thus supported, have no measurable deflection and are therefore superior in capacity to resist end shock to those of much greater weight and depth which are self-supporting between bolsters. By this co-operation between side frames and center sills a great reduction in weight per car is accomplished and yet a much stronger body structure results.

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*Abstract of a paper presented before the New York Railroad Club, March 18, 1921, followed by a summary of the resulting discussion.

The ends of the bodies of these cars are reinforced against the stresses of impact to an extent considered appropriate to the service in which the cars are employed. Some of those cars being electrically operated in tunnel service, others in suburban steam and suburban electric service, others in through line steam service at high speeds and in heavy trains.

The system of reinforcement of the ends of the car body co-ordinates the body end walls with the members of the high girder side frame and roof in the form of a rectangular tube with ends barred to prevent penetration by an impacting body. This is accomplished in the through-line car by the introduction of two new members.

1. An anti-telescoping tie plate extending across the car from side plate to side plate and lengthwise of the car for about 6 ft., forming a flat ceiling for the lavatory, passageway and saloon and being securely riveted to the plate of the high girder side frame.

2. Special deep piers forming the posts for the door in the end of the car body. These piers are approximately 21 in. deep and, as in some classes of accident they may be subjected to tension, the web plates of these piers pass through the upper tie plates and also through to the underframe and are together with their flanges securely riveted to each of these members.

The corner posts and the adjacent side posts of the car body are also specially designed to withstand the shock of cornering collision.

Careful analysis of some typical photographic records of railway wrecks lead to the following conclusions:

1. The underframe of the modern steel passenger car is adequate to withstand the shock of the most violent collision.

2. The underframe of the invading car over-rides the underframe of the invaded car and wedges its side walls apart, the point of impact being a foot or more above the floor according to the upward angle assumed by the over-riding underframe.

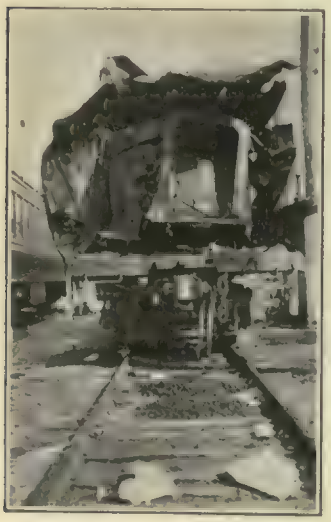
3. The superstructures of steel cars fail to protect the passenger space, when over-ridden in collision by a car having a steel underframe, because of the relative weakness of the invaded superstructure as compared with the heavy underframe of the invading body

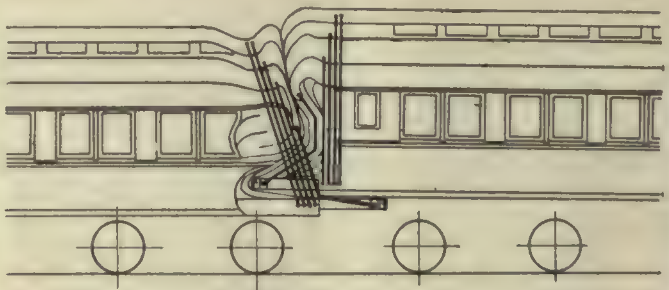
4. The joints connecting the side walls, hood an roof are subjected to tension because the invading bod having penetrated between the side walls, exerts a bursting stress on the invaded structure. The member composing the roof are always light in section and th joints connecting them to the side walls equally in adequate to resist the heavy tension stress of collision

5. The structure of the invading car is subjected t compression, and as the joints connecting its member are better able to resist compression than the invade car structure is to resist tension, the invading car bod is seldom seriously damaged.

Accurate computation of the forces expended in collision between trains is practically impossible. Tw reactions, however, occur in all rear-end collisions, whic can be used roughly to gage the violence of the shock namely: (1) Depth of penetration by the invadin car, and (2) the distance the standing train is drive ahead by the force of the collision.

With these reactions in mind it seems highly desirabl that the invading car be restrained from penetratio by some device which will cushion the impact shock an impart motion to the standing train, thus diverting th force from the work of destruction to that of motion.





TYPICAL VIEWS OF RAILROAD WRECKS AND EFFECT OF PROTECTIVE CABLES IN RESISTING PENETRATION

At left, the joints connecting the side walls, hood and roof are inadequate to resist the bursting stress exerted on the invaded structure by the invading body.

At right, the underframe of the invading car over-rides the underframe of the invaded car, the point of contact being a foot or more above the floor.

The sketch in the center shows the effect of the protective cables in resisting penetration of one car by the other.

The problem is to provide means to arrest the progress of an invading car before it penetrates deep int the structure, meantime transmitting the force of th collision to the standing train to set it in motion.

The essence of this problem is the element of time and the structure best adopted to solve the problem mus contain members which will act to resist penetration at the vestibule end and interpose a rapidly increasing resistance to the progress of the invading car.

The essential characteristics of a member best suite to accomplish the above ends are: (1) Flexibility t avoid shearing; (2) elasticity to avoid abrupt stressing; (3) high ultimate strength in tension to resist the bursting stress exerted by an invading car.

Manifestly the material best adapted to meet the above requirements is wire cable. The manner of introducing the wire cable in a car structure may vary considerably. One form may be as follows:

A wire cable anchored to the underframe of the car passing through the vestibule buffer sill, up through the vestibule corner post, across the hood, down the opposite post, through buffer sill to anchorage point at underframe.

THE PENETRATION OF THE LOCOMOTIVE SELDOM EXTENDS THE DEPTH OF THE VESTIBULE. THE GREATEST DAMAGE OCCURS WHERE ONE CAR OVER-RIDES ANOTHER

The loop is thus distended in such a manner that the vestibule end of an invading car will penetrate within the loop. The initial shock of collision will be met by the vestibule end posts. When the resistance of these end posts is overcome and as the invading body progresses, the cable loop, together with the members of the invaded vestibule, will be drawn in and down against the vestibule of the invading body, crushing both within the confines of the loop.

The more resistant the structures thus crushed, the greater will be the energy absorbed and the greater will be the pull exerted by the cable, through its anchorage in the underframe, to impart motion to the mass.

The design further provides for a second group of cables, imbedded in the body corner posts and body end frame, to act as a second line of defence against the invading car. Should the force of the collision be not completely dissipated through the resistance of the vestibule end posts and the cable in the vestibule end, the invading car body will next encounter the high resistance of the body end wall, and the second group of cables will come into action upon being encountered by the invader. The second group of cables, being also anchored to the underframe and distended in loop form, will also draw the structure of the invaded car down and in upon the invader and similarly impart motion to the mass. This second group of cables will also act to draw downward and inward the roof and sides of the invader.

The arrangement of the cables is purposely such that it is impossible to bring an abrupt stress on them. They are distended in an approximately rectangular loop by members which, when subjected to collision shock, are bent and distorted by the cable which is of superior strength to any member with which it is associated except only the center sill to which it is anchored. For example, the combined tensile strength of the cable loops shown in the illustration is 2,000,000 lb., and therefore equivalent to the ultimate strength of center sills having a cross section of approximately 50 sq.in.

WHEN THE UNDERFRAME OF ONE CAR OVER-RIDES ITS NEIGHBOR THE UNDERFRAME ACTS AS A SHEAR AND SPLITS THE SUPERSTRUCTURE OF THE INVADED CAR. THIS DERAILMENT OCCURRED AT A SPEED OF ABOUT 50 M.P.H.

Consequently when a car body protected by cables is invaded, the vestibule of the invader will be crushed down and the zone of destruction in the invaded car will be limited to the area inclosed by the cable loops engaged.

In an accompanying illustration the cable loops are shown in combination with our high girder side frame and body end reinforcement as first described. This we consider the strongest form of car body construction in use today. When completely equipped with cable loops, this design provides the following path of resistance to penetration by an invading body:

1. A rigid vestibule end wall having as high initial resistance as practicable.

2. Cable loop, inclosing the vestibule end wall and acting to retain the structural members in the path of the invading body, upon the failure of the initial resistance of the vestibule end wall.

3. A rigid body end wall including the strong piers at the doorway and the deep body end reinforcing plate, collectively more than five times the section of the vestibule end.

4. The second group of cables which will act to prevent disruption of the body end wall structure and any further penetration.

The resistance effected by the cable loops is cumulative and the ultimate resistance will not be reached until the wreckage of both vestibules is compressed in a tangled mass within the confines of the loops engaged. The crumpling of the structural members within the cable loops will act to cushion the shock. The resistance will increase rapidly in a series of steps beginning with the resistance afforded by the rigid vestibule end posts and reaching a peak equal to the accumulated resistance of the four stages in the path of resistance above described. The body end structure being of much greater strength than the vestibule end structure will insure that the vestibule structure must be practically destroyed before the initial resistance of the body end structure is overcome and the second group of cables called upon to resist further penetration. I believe that only in cases of the utmost violence will the body end of the invaded car be crushed in and the ultimate resistance of the main cable be developed.

DISCUSSION OF MR. BRINCKERHOFF'S PAPER

James E. Howard, engineer-physicist Interstate Commerce Commission, opened the discussion of Mr. Brinckerhoff's paper. He said that it appears entirely feasible to provide a vestibule construction of the type outlined which would aid in preventing destruction of the car superstructure and increase safety. He said that the best results would be accomplished by providing a flexible means to reduce disastrous effects of accidents at comparatively low speed, but he felt that at extremely high speed it would be almost impossible to prevent destruction. He expressed the belief that the dissipation of the effect of collisions should take place outside the confines of the car body and that the outer end and the vestibule should be given careful consideration. His understanding was that steel wire cable advocated by Mr. Brinckerhoff was not intended as a substitute but as an adjunct to the present type of construction. A great advantage of such cable is its flexibility which enables it to take short bends. Its greatest usefulness would be in transmitting shocks to some heavy members of the car structure.

James C. Hassett, mechanical engineer New York New Haven & Hartford Railroad, dwelt on the advantages of reducing weight in car construction and fel that the type of construction as outlined should serv a useful purpose in this respect. He thought that an anti-telescopic device would depend for its effectivenes on its ability to be efficiently anchored to the substructure of the car.

L. B. Stillwell brought out two points which shoul be of particular interest to electric railway men. Thes were that this type of construction offers a field for th reducing of weight of car bodies and also that it provides an underframe which would be particularl adapted to the installation of electrical equipment.

Association News

Committee on Valuation Meets

THE initial conference of this year's America Association committee on valuation was held a association headquarters on March 19. Those presen in addition to Chairman Martin Schreiber, Public Service Railway, were C. F. Elmes, Sanderson & Porter New York; G. W. Gillespie, Associated Gas & Electri Companies, Ithaca, N. Y.; W. H. Maltbie, United Railways & Electric Company of Baltimore, and W. H Sawyer, E. W. Clark & Company Management Association, Columbus, Ohio. Acting Secretary J. W. Wels also attended the meeting.

Two subjects, both of which were suggested by las year's committee in their report, were up for discussion One of these was on the uniform procedure of appraisals The consensus of opinion of those present was that th forthcoming report should cover in detail as far a possible the economic procedure to be followed in making appraisals with the idea of pointing out what part of the property should be most carefully inventorie due to the amount of investment involved. The othe subject was the rate of return. It was planned that discussion would be submitted by one of the committe members for analysis at the next meeting.

As this issue of the ELECTRIC RAILWAY JOURNAL goe to press the Engineering Association committees o equipment and building and structures are in session a association headquarters. Reports of their sessions wil be given in a later issue of the paper.

In a recent issue of *Commerce Reports* is a statement about the necessity of modern transportatio facilities in Harbin, a Chinese city of 300,000 population. It says that both Japanese and Russian companie attempted to obtain the contract for a street railway but it was finally awarded to a Chinese concern. Th specifications call for 8 miles of double track and miles of single track, with an overhead trolley system The Chinese company has undertaken to have a part o the line in operation four months after constructio work has been started and to pay 30 per cent of th gross receipts to the municipality as soon as cars ar running. It is unreasonable to suppose that receipt will exceed expenditures for several years after th completion of the tramway.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Sliding Scale Franchise

Committee of Engineers at Duluth Suggests This as an Incentive to Economical Management

After two months of work a committee of six Duluth engineers has drafted a service-at-cost franchise which it has submitted to the Civic Council of Duluth and to the Duluth Street Railway for consideration as a fair and reasonable solution of the city's railway problem.

The proposed franchise provides that the dividend return to the company shall vary inversely with the fare charged on the railway as an incentive to economical operation.

Franchise Submitted to Railway

A copy of the franchise has been placed in the hands of the Duluth Street Railway for comments and suggestions. The engineers will then consider all changes and in an amended form will resubmit the draft of the franchise to the Civic Council. After the franchise is finally amended to the satisfaction of the member bodies of the Civic Council, which include both business and labor organizations of the city, it will be presented to the City Council and will likely thereafter go to the people for a vote.

The outstanding feature of the franchise is that the city is permitted to retain broad rights of regulation over fares, service and improvements, while the company would be rewarded for good performance by being allowed increased dividends as the fares might decrease. The measure creates the office of supervisor of street railways in the city government and to take the place out of politics it is stipulated that the appointee to this office must be qualified with at least eight years experience in railway work, five of which must be in the capacity of an executive.

Five-Cent Fare Possible

The new franchise provides that dividends shall be paid only on the actual value of the company's property—a figure to be agreed upon later from computations covering a period of the last five years. The measure would therefore entail a recapitalization of the company to eliminate any possibility of "watered stock," which seems to be a bone of contention in the present street railway fare controversy.

The committee of engineers asserts that a preliminary valuation of the company's property has convinced it that by recapitalization the company can charge a 5-cent fare and still earn dividends of 8 per cent. As stated previously there would be a sliding scale for fares and dividends, one going up as the other went down, or vice versa.

With reference to the amortization provision of the franchise it has been stated that the length of the grant is twenty-five years. The franchise provides that if at the end of ten years the city should decide to purchase it would only be necessary to raise the fare 1 cent, thereby creating a fund out of which the property could be purchased. At the end of fifteen years the property would automatically become the city's without bond issue or any further expense.

An arbitration provision in the franchise would make recourse to the courts a last resort for the settlement of railway problems. Rates of return, service and the question of the use of traction facilities would be taken before members of this arbitration board. The city charter of Duluth already provides for arbitration of labor disputes between the company and its employees and the franchise follows in line with the city charter.

The present franchise of the railway expires in 1931.

New York's Transit Relief Measure Before Governor

The Assembly of New York on March 22 passed the Governor's transit bill by a vote of ninety-one to fifty-six. The Senate had already passed the measure, which now will be sent to the Governor for final action. W. Ward Smith, secretary to the Governor, has announced that Mr. Miller will give a public hearing on the measure at noon on March 29.

Debate on the measure brought out fiery statements. Assemblyman Jesse of New York City, a Republican, declared the Legislature's action would bankrupt the party and that Democrats might be in the majority in the Assembly in the next Legislature.

All the Democratic Assemblymen and the Socialists voted against the proposed measure.

Assemblyman Reiburn, New York City, Democrat, started the seven-hour debate by asserting the bill to be the "most brazen and bold" ever introduced in the Legislature. In the course of his remarks he said:

> The measure seeks to foist upon the people of New York City obsolete street cars and run-down railway equipment. It seeks to take away from the people any possibility that they might in the future earn a few per cent interest on the $300,000,000 invested in their subways.
>
> You Republicans are taking away the last vestige of home rule. You are attacking the faith of contracts, and the men who are putting this over will be in danger of the safety of their own property. You are committing the greatest crime against the people. You are taking their property away without due process of law.

Thompson's Plan Heard

Lively Hearing and Embarrassing Questions at Session on Chicago Traction Issue

As a result of a public hearing held before the Illinois State Legislature on March 15 it was announced that several important amendments would be offered in connection with the plan of Mayor Thompson for "people's ownership" of the Chicago Surface Lines and a 5-cent fare. It is understood that the Mayor of Chicago will agree to changes in his bill which will provide for a referendum vote prior to the granting of additional taxing powers for the purpose of paying a deficit in operating expenses; a referendum vote if the question should arise of absolute purchase of street railway property in the "transportation district"; provision for a lower fare than 5 cents if this becomes possible; referendum vote to decide whether the $25,000,000 now in the "traction fund" should be turned over to the "district."

Mayor His Own Spokesman

Mayor Thompson as well as Special Counsel Cleveland and Barrett spoke on behalf of the proposed legislation. They had to answer some embarrassing questions, and when Attorney Cleveland was asked why the present utilities commission, which is favorable to the city administration, did not take steps to establish a 5-cent fare at once he said:

> As long as the present utilities act is on the statute books we must abide by it. Repeal the utilities act and we can start something.

The Mayor stated positively that the city could operate the surface lines at a 5-cent fare at a profit. Attorney Cleveland was asked why it is not intended to include the elevated lines in the plan, and he replied that inasmuch as these roads were organized under different laws and owned their right-of-way it would not be policy to attempt to put them into the initial plan.

Attorney Cleveland also expressed the opinion that the surface lines could at least have made operating expenses in the past year under a 5-cent fare. When he was asked if he thought it right to spend the taxpayers' money to pay any part of street car fares he said:

> If the taxpayers can be forced to furnish the money to build boulevards for the rich who ride over them in automobiles it will be perhaps just as well for part of the taxes to be spent in a way that will give the great mass of the people some benefit.

One objection was that the bill creates a new taxing body while a great number of taxing bodies are already operating in Chicago. Further consideration of the bill was deferred.

Taxpayers Not Restrained

Suit by Fourteen Residents of Seattle in Municipal Railway Fight to Proceed to Regular Trial

In a decision handed down on March 13 Federal Judge Jeremiah Neterer denied the motion sought by the Puget Sound Power & Light Company, Seattle, Wash., for a temporary injunction to restrain the fourteen taxpayers suing the city in Superior Court from doing any act which might result in causing a breach of the $15,000,000 railway contract, or default in payment of the interest on the bond issue. Judge Neterer held that there is no controlling force in the statement made by attorneys for the company that the state court is without jurisdiction, and should be enjoined from proceeding in the taxpayers' action.

Judge Neterer held that the taxpayers' action in the Superior Court is to protect the general fund of the city from invasion for the purpose of depleting the special fund for any purpose. The recourse of the plaintiff, he held, is clearly to maintain the integrity of the special fund.

The court refused to enjoin the state court in proceeding in this matter and held that it is presumed to have full jurisdiction. The taxpayers, Judge Neterer held, are not proceeding against the special fund, which is separate and distinct from the general fund. The temporary restraining order against the fourteen taxpayers, issued on Feb. 21 and continued on March 1, has accordingly been dismissed.

ANOTHER HEARING FIXED

Attorneys for the Puget Sound Power & Light Company, following Judge Neterer's decision, immediately filed a new motion in the U. S. court, asking again for a temporary injunction against the taxpayers. The new motion asks that a temporary injunction issue, restraining the taxpayers, and each of them "during the pendency of the above entitled cause from instituting any suit against the plaintiff or making the plaintiff a party to any suit which it is or shall be claimed, that any provisions of the bonds issued by the city of Seattle, under ordinance 39,025, are invalid, or that alleges or claims that the city of Seattle was not obligated, out of the gross revenues of the municipal street railway system to pay into the special fund, created by such ordinance, the principal and interest of such bonds as provided by such ordinance."

The new motion was set to be argued on March 21.

Boston "L" May Run Buses

The Boston (Mass.) Elevated Railway has petitioned for permission to own and operate motor vehicles which do not run on tracks or rails. The matter was brought to a head by a notice from the city of its intention to repave Market Street, Brighton. This would make necessary relaying of the elevated's tracks on this street at an estimated cost of about $85,000. Inasmuch as only 1,700 people use this line daily, the trustees of the road decided that the expense was prohibitive.

If the pending petition is granted, operation of electric cars on this 1½-mile line will be discontinued and instead two buses will be operated, whether 16 or 25 seaters has not yet been decided. Fare will be the same, with better headway.

It is said that from time to time, as it becomes necessary, to rebuild the tracks on poorly patronized lines the elevated may again have recourse to the jitney franchise, but at the present time the Market Street line is the only one where the change is considered necessary.

One-Man Car an Issue in Pennsylvania

R. H. Horton, traffic engineer of the Philadelphia Rapid Transit Company, appeared recently before a committee of the Pennsylvania House in opposition to a bill introduced in the Legislature making it unlawful to run or operate or permit to be run or operated any car on a street passenger railway with a crew consisting of less than two men.

He said that the bill would affect the Philadelphia Rapid Transit Company in three ways: (1) In the operation of safety cars; (2) in the operation of trains of surface cars; (3) in the operation of subways and elevated lines. He showed that all three of these methods of operation as at present conducted by the company are safe, economical and advantageous. In conclusion he said:

> We realize that this committee is not so much interested in maintaining economical conditions for Public Utility Companies as in protecing the lives, interests and rights of the citizens, but I wish to point out that if this bill is enacted it will not make street railway transportation any safer, but these companies will be obliged to employ more men to do work which is not useful and we maintain that every man not doing useful work is a charge on the community and no less so than if he were in the Almshouse. Particularly is this so in this case because the laws of the State, enforceable through the Public Service Commission, limit the amount of return which a street railway may earn, but in limiting it state that these companies should earn a reasonable return upon a fair valuation of the property. That being the case it means that the citizens will pay the operating expenses of these companies and a reasonable return and it also means that every legitimate economy which can be made in those operating expenses will immediately reflect itself to the advantage of the citizens in that it means improved service or a smaller bill that they will have to pay.
>
> I present for your consideration the fact that through advancing costs service has been removed from 1,596 miles of electric railway track in the United States during the past three years, and 931 miles of track of this has been junked. Upward of 5,700 one-man cars are in use and were it not for their proved safe, economical operation, many communities would be entirely deprived of transportation.
>
> Street railways in Pennsylvania have not had an easy time through the period of the war or the reconstruction period following, and I believe that the Legislature very clearly sees that all legitimate economies which the railways can make should be encouraged and not condemned.

The Philadelphia Rapid Transit Company owns twenty-five safety cars which are all operated on what are known as the Darby, Media and Chester division.

Nominations Rejected

New Jersey Legislature Fails to Co
firm Governor's Selections—New
Names Advanced

New Jersey's Public Service Comm
sion has most certainly become t
plaything of politics. Within the sta
itself the various moves that have be
made in connection with the commissi
are all well known, but they do point
moral elsewhere. One of the latest
velopments was the failure of the Le
islature on March 20 to confirm as co
missioners two of the three men pre
ously nominated for places on the co
mission by Governor Edwards, a Dem
crat and a hold-over. Since th
however, another chapter has be
added by the Senate confirming
March 21 the nominations of Jud
Harry V. Osborne and former Jud
John J. Treacy, Democrats.

SENATORS PLAY POLITICS

The men who had been rejected
appointment were James A. Ham
Jersey City, former Congressman,
Joseph E. Hoff, Princeton. The refu
of the Republican majority in
Senate to confirm Mr. Hamill and
Hoff was put upon the ground that
appointees were not men of affairs, p
sessing the qualifications needed
public utility commissioners. Intim
tions that political consideratio
among them a desire to embarrass
administration, prompted the Senate
tion were resented by the Republic
members of that body. It is, howev
significant that in confirming the
pointment of Harry Bacharach, form
Mayor of Atlantic City, the Senat
supported the only Republican no
nated.

Last September the Governor remov
the old commissioners from office on
charge of neglect or misconduct. T
the commissioners resented. They qu
tioned the right of the Governor in
courts. The Supreme Court upheld t
official. Appeal was then taken to
Court of Errors and Appeals. T
body likewise sustained the Govern
The board, however, continued to fu
tion as a regulative body until
Supreme Court decision affirming
"ouster" was rendered on Dec.
Since then there has been no regulat
body acting. Meanwhile the Legis
ture passed a measure amending
utility act so as to curtail the pow
of the Governor in the future by m
ing the removal of commissione
possible only through impeachment.

EMERGENCY LEGISLATION PENDING

Matters have been complicated s
further by a provision in the util
law that changes in rates filed with
commission and not acted upon with
three months shall go into effect au
matically. In consequence of this cla
the Public Service Railway will be in
position, if it so desires, to put into eff
10-cent fares throughout New Jers
on April 1. Emergency legislation
pending, however, which would meet
situation thus arising.

Municipal Ownership Urged

Author of New Orleans Bill Says Persons Interested in Preserving Private Ownership Have Forced Issue

Former Senator E. M. Stafford, delegate to the State Constitutional Convention from the eleventh ward of New Orleans, La., and sponsor for an ordinance intended to place the local railway system in the hands of the city, disclaims hostility to present security holders, but says the public has lost faith in eastern transportation "Greeks" bearing gifts.

SEES CITY OWNERSHIP ONLY SOLUTION

On the contrary, he says, as much as he was formerly opposed to public ownership, just so insistent is he now that with proper safeguards municipal ownership furnishes the only solution of the problem. He maintains that the railway itself has forced the hand of the municipality through the present broken down system of transportation, discredited and unable to finance itself to function properly. He contrasts the management of the old water-works company with the present management of the Sewerage & Water Board, and asks pointedly: "Who would want the old water-works system back again?"

He said in part:

> In New Orleans the hand of the municipality is being forced. If private persons had run the railway system satisfactorily the subject would never have come up for discussion. In the railways matter public ownership is being forced by those who have loudly protested against such ownership.
>
> On one hand we find a broken down system of transportation, discredited and unable to finance itself to function properly, and on the other hand we find a patient, suffering community which has to put up with a decrepit system, and to pay increased rates for inferior service.
>
> Public ownership of this utility is the only solution for the tangled situation. Please bear in mind that public ownership is not a theory advanced by radicals, but is forced on the municipal authorities by the failure of private ownership. The problem of readjustment appears too large for local financial interests, and the public has lost faith in eastern transportation "Greeks" bearing gifts, whose management of a great public utility has caused the public to lose faith in public utility investments. The credit of the city seems to be the only solution. The people must have better service and at a reduced cost.
>
> We remember how the old water-works company was managed. It gave us muddy river water and poor service and defied the people, just as the railway is now doing, until the state authorities took charge of the matter. Who would want the old water-works system back again? Surely public ownership of this utility has been a success.
>
> As much as I was formerly opposed to publish ownership I am now convinced that with proper safeguards it is the only solution of the great problem that has been forced on the people of New Orleans for solution.
>
> I am not determined on the passage of the ordinance without amendment. I realize that the time of the convention is short, and if the people are to obtain relief through its efforts the matter must be placed before it in time to secure the best thought of the members of the body.

SERVICE-AT-COST OPPOSED

The Building Trades Council of New Orleans has filed a protest with the Commission Council against the adoption of the cost-plus plan of operating recommended by the eastern representatives of the security holders of the New Orleans Railway & Light Company. This method had also been approved by the special masters in chancery, appointed by the judge of the Federal District Court, as one of the means of solving the railway problem. Commissioner Maloney, of the public utilities committee of the Commission Council, is himself rather lukewarm in his support of the cost-plus plan.

The citizens' advisory committee at New Orleans has asked the public to help straighten out the railway tangle. This appeal is made by and through Hugh McCloskey, chairman of the advisory committee and former president of the New Orleans Railway & Light Company.

Labor Surplus on Coast

There is a surplus of labor available for electric railways on the Pacific Coast. The Pacific Electric Railway, Los Angeles, has announced that it is on the point of refusing additional applications and the United Railroads, San Francisco, has ceased counting the number of applications received. As matters stand now the labor turnover is comparatively low and the morale is greatly improved. The United Railroads employed less than twenty men in the month of January.

A strike recently of union employees of the Great Western Power Company, called almost without warning, was promptly broken and after a few days the company was able to recruit more men than were needed.

Union labor, however, exerted a powerful influence at the California State Capitol. The King tax bill, referred to previously in the ELECTRIC RAILWAY JOURNAL, proposes an enormous increase in the taxation of large corporations, public utility corporations included; the proposed eight-hour law would increase the operating cost of the electric railways of the State by many millions of dollars annually and the anti-safety car law, well camouflaged but nevertheless purely a labor measure, would prohibit the operation of the 268 safety cars now in service in California. The King tax bill, while it did not originate with the union organizations, was supported by that element.

One in Fourteen Has an Auto

Western states have taken to the automobile much more rapidly than has the East and South, according to data secured by the Omaha Chamber of Commerce from the state departments handling automobile registrations in each State. There are now about 7,500,000 automobiles in the United States or an average of one for each 13.8 persons, according to the figures compiled. Trucks are included with pleasure cars because many states do not segregate the types of vehicles. California heads the list with one car for every 6.2 persons. Iowa ranks fourth with 7.9, New York thirty-fifth with 18.6 and Mississippi last with 41.1. Of the first 25 on the list, twelve are western states; the last 10 are practically all southern or southeastern states.

Power Matter a Problem

This and Wage Contract and Interurban Railway Operating Agreement Consume Attention at Toledo

While Toledo's bus regulatory measure lies slumbering in Council the officers of the Community Traction Company and Commissioner W. E. Cann have before them the matter of a power contract, new wage contracts, and the framing of interurban contracts.

POWER RATE CONSIDERED HIGH

The power contract, submitted by the Toledo Railways & Light Company and signed by officials of the Community Traction Company, has not been approved by the commissioner. He said he felt the rate was too high. The Rail-Light is asking 2.35 cents a kw.-hr.

This matter of the rate will be left entirely to Prof. H. E. Riggs of the University of Michigan, who has completed a survey of the local generating and distributing properties as a basis for a street lighting rate. The legal aspects of the contract have been passed upon by the city law director, who has picked what he considers a number of defects in the agreement.

Representatives of city and the company will sit down and iron out differences as soon as Mr. Riggs reports. If they cannot agree the Public Utilities Commission may be called in to establish a rate. In event they do not act the matter is submitted to arbitration.

The new wage contracts submitted to President Frank R. Coates, of the Community Traction Company, are practically identical with those of last year, which expire April 1. No increases in wages have been asked. The men are receiving 54 cents for first three months, 56 for additional six months, and 60 cents maximum at the present time. The company officials have not made any announcement concerning their attitude on the wages asked.

For the purpose of framing the contracts under which all the interurbans will operate in Toledo a committee has been named consisting of Commissioner W. E. Cann, representing the public; W. S. Roger, general traffic manager of the Detroit United Railway, representing the interurbans, and H. T. Ledbetter, representing the traction company, which owns the city lines. The ordinance provided for a ninety-day period for getting the contracts ready.

PASSAGE OF BUS ORDINANCE PUT OFF

The bus ordinance has been opposed by some union labor representatives but it is favored by the carmen's union. For three weeks now the vote on the ordinance requested by the Mayor, Commissioner and other city officials to regulate, bond, license, and determine routes for buses has been postponed from week to week. At each session Council has been beset with a lobby of bus owners.

Railway Plan Expounded

Assistant Manager of D. U. R. Speaks in Behalf of Detroit's Proposed Service-at-Cost Ordinance

E. J. Burdick, assistant general manager Detroit United Railway, on March 4 outlined before the Detroit Engineering Society the proposed service-at-cost ordinance which his company has prepared to submit to the voters of Detroit on April 4, through its initiative petition. He went into detail relative to the points wherein the service-at-cost plan differs from the cost-plus system, which has proved unsatisfactory in so many cases.

Preliminary to discussing the terms of the service-at-cost ordinance, Mr. Burdick gave figures which indicate the magnitude of the Detroit United system, and presented a brief résumé of the past dealings between the city and the company. The statement was made that the entire Detroit United system comprises about 1,000 miles and serves nearly one-third of the population of the state of Michigan.

Only the high points of the ordinance were touched upon by Mr. Burdick, with all references to politics strictly excluded. He explained that the thirty-year grant mentioned in the service-at-cost ordinance is not a franchise as the city has full control and right to purchase at the end of any year and the right to lease at the end of any year after the fifth year. The valuation of the property upon which the city, according to the ordinance, would guarantee a 6 per cent return is to be fixed by a board of arbitrators and cannot exceed the 1919 appraisal of $31,500,000. On this same valuation the city is to set aside monthly a sum sufficient to provide 2 per cent per annum to be placed in the city's sinking fund and to be used at the discretion of the city.

After dwelling briefly on the principal features, Mr. Burdick invited questions from engineers present. Some interesting questions were raised regarding the provisions of the ordinance and were fully explained in turn. Mr. Burdick was emphatic in his statement that there is no "colored gentleman in the woodpile." The ordinance, he said, is an earnest attempt on the part of the Detroit United Railway to settle Detroit's street car question once and for all along fair lines.

New Utility Court Planned in Iowa

Another court to interpose between the Iowa public utilities and their constituents is provided for in the Springer bill which has been adopted in the House of Representatives. The bill proposes to create a court of public service composed of three district court judges appointed by the chief justice of the Supreme Court of the State to review upon appeal all disputes between cities and public utilities as to rates and service. It grants to every corporation which comes under its plan an indeterminate permit to operate, terminable by the court of public service, whenever the court considers its continuance against public interest.

All light, power, gas and electric railways come under the provisions of the bill but telephone companies are excepted. An attempt to exempt Des Moines City Railway from the indeterminate franchise feature was defeated. If the bill should become a law both the Des Moines City Railway and the Des Moines Gas Company cases would probably come before the new court.

Electrification May Save Road

The Chamber of Commerce of Kansas City, Kan., has interested itself in a recent project to keep the Kansas City-Northwestern Railroad operating. The road has been in receiver's hands and the possibility of its being junked seemed very likely. A movement is now under way, however, to prevent this and to electrify the road, operating trains from the municipally owned electric light plant in Kansas City, Kan. L. H. Chapman, commissioner of water and lights in Kansas City, has stated that the city could afford to make a very low rate for power to bring about the electrification of the line. An engineering firm of Chicago agrees with Mr. Chapman that the project is a feasible one and that business men should not overlook so great an opportunity to continue the road in operation. Before anything tangible can be done funds must be raised to liquidate debts incident to the receivership.

Connecticut for a Square Deal

Results of a state-wide referendum by the Connecticut Chamber of Commerce indicate public opinion in Connecticut to be strongly in favor of legislation looking toward solution of the electric railway problem. This referendum follows a special report on electric railway conditions of the State compiled after nearly two years' work by a special committee consisting of Morgan B. Brainard, Hartford; Arthur L. Kimball, New Britain; R. W. Perkins, Norwich; Percy T. Litchfield, Bridgeport, and Arnold Turner, Danbury. The vote was overwhelmingly in favor of:

> All common carriers engaged in similar business being similarly taxed.
>
> Street railways being relieved of all paving requirements except the obligation to repair paving actually damaged by the companies.
>
> Street railways being relieved of all bridge building and maintenance requirements except the obligation to install and maintain the rails, wires and accessories used exclusively by the companies.
>
> Street railways having authority to operate motor buses in substitution for, or auxiliary to, existing lines, and to establish new bus lines, subject to jurisdiction of the Public Utilities Commission.
>
> Street railways having authority to abandon non-paying lines, or parts of lines, with permission of the Public Utilities Commission, after hearing.
>
> Municipal ownership only where it is impossible to induce private capital to operate a railway.
>
> Fares being determined by the relative cost of operating the street railway lines within a municipality or group of municipalities so interrelated as to riding habits as to make up a railway system essentially distinct from other systems in the state.

Forcible Arbitration Soug

Another Hearing at Albany on Ap of Men to Require Strike to Be Arbitrated

Supreme Court Justice Howard Troy, N. Y., on March 19 heard application by Albany and Troy st ers for a peremptory writ to f arbitration of the dispute between United Traction Company and its ployees. Attorneys for the comp fired eleven legal broadsides at the p tion of the strikers. Chief among legal objections raised by the comp to the application which sought to voke section 275 of the laws of 1 the so-called "arbitration law," c pelling arbitration of a dispute betw two parties to a contract, were the

> That the petitioners (the presidents of two unions) are not employees of the Un Traction Company.
>
> That the petition does not show that the members of the Albany and Troy un are employees of the company.
>
> That the statute law 275 does not aut ize the petition nor authorize the petitio to maintain the proceedings.
>
> That the arbitration clause in the tract between the company and its ployes specifically mentions employees, not members of the unions.

RAILWAY ATTORNEY EXPLAINS

Attorney Norton for the company further explanation said:

> I want to call attention to section thi six, the arbitration section. Now is not a general arbitration clause. specifically sets forth that a month be the contract expires there shall be arbi tion, which, if it is construed that the tract expires July 1 next, would mean too early for arbitration, or that if it pired Nov. 1 last, when the wage provi expired, it is too late for arbitration.
>
> Our final objection is that the petition the face does not show the existence any provision in a written contract to se by arbitration a controversy between petitioners or their alleged unincorpora associations and this respondent. I wan call the attention of your honor to the that the word "employees" is used and the members of the said incorporated sociations.

When the attorneys for the Uni Traction Company had finished th arguments the attorneys for the str ers were forced to ask that the ar ment of the petition be continued give them time to answer. An arran ment was finally suggested by Just Howard whereby the hearing will continued on March 26. In the me time both sides will file briefs.

For the benefit of the Mayors of five cities in which the company op ated Vice-president Weatherwax reviewed the strike situation in a let to them, indicating the extent to wh the municipalities will be held liable the railway for damage sustained its property. Paragraphs from letter touching specifically on the matters are as follows:

> We shall expect to be reimbursed the destruction of our property, which been substantial, and bills are in cou of preparation and will be sent you in course. It is unfortunate that the t payers must assume this burden. We c not expect, however, to be reimbursed the personal assults and damages to employees. Human rights in this particu case seem to be subordinate to prope rights.
>
> We believe that further and more eff tive measured should be taken to safegua the rights of the public, our employees a our property, and hope that you can range to accomplish this at once.

Philadelphians Rejoice

Ten Years of Co-operation on P. R. T. Under Stotesbury-Mitten Management Celebrated by Banquet

E. T. Stotesbury and T. E. Mitten were tendered a testimonial banquet at the Hotel Lorraine on March 2 by the co-operative committees in celebration of the tenth anniversary of the successful operation of the co-operative plan on the lines of the Philadelphia Rapid Transit Company. Mr. Stotesbury was unable to be in attendance, due to his absence in Florida. The toastmaster was F. W. Johnson.

He said that only by looking back to March 2, 1910, was it possible to measure accurately the progress made since that time under the Stotesbury-Mitten management. John Lumbery, chairman of the employee committee of the transportation department, and other speakers from various branches of the service responded. They all reiterated the wonderful accomplishments under the present management.

THRIFT VALUE EXPLAINED

George W. Jackel, chairman of the general office department committee and president of the saving fund, told of the work done in inculcating thrift among the employees. Employees in the savings fund now number almost 8,000 members, with more than $1,000,000 well invested and money being deposited at the rate of more than $1,000,000 a year. This fund was started in 1919, when nearly everybody was spending madly and recklessly. In the face of this tendency of the times Mr. Mitten had pointed out to the employees the foolishness of such recklessness and had converted many employees into consistent savers.

George I. Zellers, another speaker, recited the difficulties overcome in winning the men to the Mitten plan after the ill will engendered previous to the coming of the Mitten management. He said that Mr. Mitten, however, had not only fulfilled his promises but had exceeded them. An engrossed volume containing the names of 10,214 employees of the company was presented to Mr. Mitten, and a similar volume was forwarded to Mr. Stotesbury.

Mr. Mitten was deeply moved. He said that the recent booklet showing the ten years of accomplishment under the Stotesbury-Mitten management, to which reference has been made before in the ELECTRIC RAILWAY JOURNAL, was put together at his suggestion for two reasons; first, so that the men might have before them a definite statement of the things that had been accomplished and in which they had had a part, and, second, because, knowing that Mr. Stotesbury had completed his term of work with the company, Mr. Mitten wanted to establish Mr. Stotesbury's work in the form of a monument to him.

He said that Mr. Stotesbury has already done for Philadelphia more than any other citizen could be asked or expected to do. He said that he was sending a telegram in testimonial to Mr. Stotesbury that he was sure "will sweep out of his mind clearly and cleanly all the difficulties that have occurred during his connection with us and leave only the wonderful feeling of accomplishment, so that he may consider that this ten years of work has been one of the greatest, if not the noblest, acts of his whole career. At least I am sure, and I am more certain of it than ever from that rising vote and that unanimity with which you arose, that we all together give him in saying farewell our respect and the love of the whole organization."

BUILDING FOR PERMANENCE

Mr. Mitten said that the call had come repeatedly from other cities to show them the way. During the last two years he had developed an organization which was self-perpetuating. The working out of the plan which the Mitten interests have in mind went beyond one man's lifetime. He then referred somewhat at length to the plan of organization of the Mitten Management, Inc., with Messrs. Tulley, Dunbar, Richardson, Joyce and P. J. Mitten as vice-presidents.

Mr. Mitten said that while he expected to die in harness he was nevertheless sure that the work would go on without him when his time came. It was in discussing this and other matters that Mr. Mitten made the reference to his son, Dr. Mitten, which has been quoted previously in the ELECTRIC RAILWAY JOURNAL.

In the testimonial to Mr. Mitten signed by the employees this hope was expressed:

"May your principles and practices serve as a perpetual well-spring of inspiration to others, and may their benefits and benign influences be extended to workers throughout all the land."

News Notes

New Agreement Will Call for Wage Cut.—It is reported that within the next two or three days the New York State Railways will offer the men in Rochester, Syracuse, Utica and Rome a new contract calling for a cut in wages from 60 to perhaps 45 cents per hour. The agreement between the company and the men expires on May 1 and under one of its provisions proposals for a new agreement must be submitted before April 1.

Bus Must Not Compete With Railways.—Permission to operate a bus line between Springfield and Peoria has been granted the Peoria-Springfield Motor Transit Company by the Illinois Public Utilities Commission. The company is allowed to have stations in seven towns, not including the terminals in Peoria and Springfield. The order of the commission prohibits the company from competing with any bus line now operating or with the electric railways in Peoria or Springfield.

"Ship by Trolley and Save the Highways."—The Indiana Service Corporation, Fort Wayne, Ind., has recently been doing some interesting advertising for the purpose of building up its freight business. This advertising has taken the form of "ads" three columns wide by 8 in. high. The only copy appearing in these advertisements has been this phrase: "Ship Your Freight By Trolley and Save the Highways."

Minnesota Measure Amended.—Eight amendments affecting the wording and intent of the substitute measure for the Brooks-Coleman bill providing for regulation of rates and securities issues of electric railway companies in Minnesota were adopted in the senate on March 10. A tenth amendment was rejected. Among the accepted amendments was one providing that only Minnesota corporations can receive indeterminate permits and franchises. Another designates the manner in which cities may acquire railway properties.

More Buses for San Francisco Municipal System. — A committee of citizens representing residents of the Twin Peaks district in San Francisco, Cal., have secured the approval of the Board of Supervisors for a bus line to serve this district and connect with municipal cars on the Market Street line. Two buses would be sufficient, according to the committee, to maintain the desirable service. The proposal is that the buses be put on as soon as the Market Street extension, a regrading project, is completed.

Municipal Men Still Seek Pay Increase.—Track and platform men of the San Francisco (Cal.) Municipal Railway have renewed their efforts before the Public Works Board to obtain a $1 a day increase in pay, which would mean a $6 a day wage. Failing to obtain the increase the men will appeal to the Board of Supervisors to meet the raise. The increase would effect more than 800 men. The Municipal Street Railway employees have been endeavoring for two years to obtain the $1 a day increase in pay.

Hearing on Utility Bills in Pennsylvania.—The various bills amending the Public Service Company law of Pennsylvania came up at public hearing on March 15 before the House judiciary general committee, and because only a fractional part of the representatives of the municipalities and public utilities had an opportunity to discuss the bills the hearing was continued after a two-hour discussion until March 22. The committee confined the remarks to the Fitzgibbon bill, giving the Public Service Commission discretionary powers to suspend increased rates until final action is taken by the commission and the McVicar bill, which requires that the utilities file data showing why increases are desired when making application for higher rates.

Financial and Corporate

New Cincinnati Directors

Indications Point to Early Consummation of Changes Suggested by Street Railway Director

Developments in the railway situation at Cincinnati, Ohio, during the past week included announcement of the appointment of two new directors of the Cincinnati Street Railway and the naming of a stockholders' committee among certain interests in Cincinnati Street Railway stock.

Charles W. Dupuis, president of the Citizens' National Bank, and Attorney Robert A. Taft, son of the former President of the United States, William Howard Taft, are the new members on the Cincinnati Street Railway board. Mr. Dupuis succeeds Stephen R. Burton and Mr. Taft succeeds Edward Goepper. It is understood that Mr. Taft represents the Taft and Mr. Dupuis the Kilgour interests on the board, adding thus to the influence of those two sets of interests in the directorate.

The personnel of the committee of stockholders includes Charles P. Taft, William Worthington, Edward Colston, Robert A. Taft, Edward W. Strong, Samuel Assur, Rufus B. Smith and Charles F. Windisch. Two of the members, Charles P. Taft and Robert A. Taft, are members of the directorate.

In connection with the announcement of the formation of the committee it was stated that the committee was appointed for the purpose of considering the problems arising out of the present situation. Just what relation it will have with the board or with the stockholders in general was not outlined. No intention to seek proxies or to represent other interests among the stockholders was indicated. The committee is considered to be strongly representative of the Taft interests.

The present situation continues to be the subject of daily conferences and consultation among the various interests. The conference committees of the Cincinnati Street Railway and the Ohio Traction Company held a meeting last week in an effort to reach an understanding as to the proposed reorganization of the two companies as demanded by William C. Culkins, Street Railway Director. At the conclusion of the meeting announcement was made that more time was needed to discuss the different phases and that a report of the committee's decision would be made when an agreement was reached. In the financial district it is believed that a practical plan for financing the system will be devised and submitted to the directorate and stockholders as a result of the conferences.

Mr. Culkins said that while he was not aware of the purpose for which the stockholders' committee had been formed he considered it to be in line with his recent request that steps be taken by the Union Traction Company, the Cincinnati Street Railway and the Ohio Traction Company to reorganize into an operating company.

The object of the reorganization, as proposed by Mr. Culkins, was to bring about a reduction of fares. He called upon the three companies to reduce their capitalization, settle certain demands which are said to be outstanding against the companies to the extent of $300,000 or $400,000, and to surrender the franchises under which they are now operating.

Another conference of the committees has been called for March 28.

Bids for Railway Sale Authorized

Justice George W. Cole in the Supreme Court of Erie County has issued an order authorizing William B. Cutter, as receiver, to advertise for bids for the sale of the property of the Buffalo & Depew Railway, Buffalo. The bids will be for all or any part of the equipment of the interurban line between the Buffalo city line and the village of Lancaster. It includes machinery, rails, ties, bridge, carhouses, power house and all other property real and personal including franchises. Bids may be made upon the understanding that the successful bidder shall have the right to operate or junk the property.

A partial list of the property shows 1,315 gross tons of steel rails; 121 gross tons of miscellaneous iron; 2,894 lb. of copper bands and ears; 12 miles of 00 trolley wire weighing about 25,464 lb.; approximately 12 miles of 350,000 CM feed wire weighing about 67,668 lb.; feeder taps and cross bonds weighing about 1,000 lb.; 27,000 railway ties; 90,000 ft. of bridge timber; four two-motor passenger cars; one four-motor work car and plow; one three-motor sweeper; and office furniture and fixtures.

Subway Alone Earned Charges

According to a statistical statement recently issued by the New York Public Service Commission, First District, all the railways in the Borough of Manhattan except the Subway Division of the Interborough Rapid Transit Company failed to earn fixed charges for the six months ended Dec. 30, 1920.

Two of the three companies divorced from the New York Railways combine failed even to meet operating expenses, while the third—the traction lines of the New York & Harlem Railroad—failed to meet its fixed charges.

The Third Avenue Railroad, including its subsidiary Westchester lines, earned its fixed charges except for full interest on its adjustment income bonds. A statistical study follows:

INCOME ACCOUNT — TRANSPORTATION SYSTEMS IN MANHATTAN AND THE BRONX

Six Months Ending Dec. 30, 1920

	Interborough Rapid Transit Co.								
	Total	Subway Division	Manhattan Elevated Division	New York Railways	Eighth Avenue Railroad	Ninth Avenue Railroad	Second Avenue Railroad	New York & Harlem Traction Line	Third Avenue Railroad (d)
Passenger revenue	(c)	(c)	(c)	$4,287,384	$561,607	$247,779	$476,136	$808,810	$6,565,646
Other revenue	(c)	(c)	(c)	512,053	10,625	5,000	28,208	13,153	176,313
Total operating revenue	$26,969,396	$16,806,448	$10,162,947	$4,799,437	$572,232	$252,779	$504,344	$821,963	$6,741,959
Operating expenses	18,034,299	10,764,966	7,269,333	4,613,994	619,317	300,941	479,498	764,004	5,464,491
Operating revenue	$8,935,097	$6,041,482	$2,893,614	$185,443	*$36,985*	*$48,162*	$24,846	$57,959	$1,277,468
Taxes	1,311,268	210,679	1,100,588	393,653	45,117	27,031	45,985	30,000	316,291
Operating income	$7,623,829	$5,830,803	$1,793,026	*$208,210*	*$92,202*	*$75,193*	*$21,139*	$27,959	$961,177
Miscellaneous income	316,253	(b) 290,790	25,463	293,155	17,415	1,875	922	257	....
Gross income	$7,940,082	$6,121,593	$1,818,469	$84,945	*$74,787*	*$73,318*	*$20,217*	$28,216	961,177
Fixed charges	10,622,342	5,939,602	4,683,239	1,402,725	37,706	3,904	94,835	108,550	771,721
Net income	*$2,682,260*	$181,989	*$2,804,749*	*$1,317,780*	*$112,493*	*$76,222*	*$115,052*	*$80,334*	(a) $189,473
Revenue passengers	496,595,522	308,285,537	188,309,985	83,298,107	11,232,143	4,973,305	9,852,902	16,176,205	133,883,595
Revenue transfer passengers	....	....	....	6,453,797	....	....	....	....	....
Free transfer passengers	....	....	....	2,034,057	....	11,939	251,553	1,638,856	27,529,721
Total	496,595,522	308,285,537	188,309,985	91,785,961	11,232,143	4,985,244	10,104,455	17,815,061	161,413,340
Miles of track	348.62	223.48	125.14	(c)	(c)	(c)	(c)	(c)	(c)
Active passenger car-miles	85,922,894	50,986,431	34,936,463	6,953,625	1,366,785	802,871	919,287	1,609,980	11,283,069
Passenger car-hours	(c)	(c)	(c)	1,047,519	189,820	104,941	132,663	213,321	1,440,189
Car-seat-miles — active	(c)	(c)	(c)	296,986,222	43,737,088	28,903,356	42,044,627	66,742,190	514,114,700

Note.—Figures in italics indicate deficit.

(a) Applicable to adjustment bonds — with interest charges of $563,399.

(b) Includes other operations (c) Details not available.

(d) Financial figures include and traffic figures exclude Westchester companies operating no cars in New York City.

$58,100 Deficit in Toledo

Showing for First Month Under Service at Cost Regarded as Far From Disappointing

Operations for the month of February, 1921, of the Community Traction Company, Toledo, Ohio, showed a deficit of $58,176, according to Commissioner Wilfred E. Cann, in his first monthly report to the Board of Control. In commenting on the report, Mr. Cann said:

> In view of the fact that a relatively low rate of fare, as compared with last year, became effective on Feb. 1; that industrial conditions in the city are in a stagnant condition; that we have not as yet had time to put into effect economies which may result in the rerouting of cars, I think you will agree that the showing made is far from disappointing, and I can safely assure you that despite the decrease in revenue for the first seven days of March over the first seven days of February this month's report will show a greatly improved condition.

The table gives details of operation for February, 1921.

The Community Traction Company has rented for office space the entire fourth floor of the Toledo Railways & Light Company building for $1,650 per month. The tax reserve set up for February is practically double what it would be ordinarily, due to the company being compelled by ordinance to have its fiscal year agree with the calendar year. The monthly tax reserve will approximate $7,750 hereafter.

The monthly credit to the depreciation fund has been fixed at the minimum allowed by the ordinance; namely, 0.5 per cent of the capital value. This amounted to $3,541 for the month. An allowance of 8 cents per revenue car mile is being made temporarily to the maintenance and repair fund. Undoubtedly this is insufficient to cover the necessary work for during the month of February the work undertaken cost $360 more than the allowance.

The city has through the operation of the sinking fund gained an equity in the company for the month's operation equivalent to $17,708. The interest on bonds and dividends on preferred stock was paid to a trustee to be held for the city until the company lifts the mortgage on the railway property.

The Toledo Railways & Light Company asked for a rate of 2.35 cents a kilowatt for power under a 25-year contract, compared to a rate of 2.28 cents per kilowatt as was formerly charged off to the railway department by the old Rail-Light company. Commissioner Cann states that the ordinance provides that the rate for power shall be a "reasonable charge based upon cost of generating power in a modern power plant," and that he has submitted the contract to Professor H. E. Riggs, University of Michigan, for comment.

STATEMENT OF INCOME, ACCRUAL AND OPERATING EXPENSES OF THE COMMUNITY TRACTION COMPANY, TOLEDO, OHIO

	Feb. 1920	Per Cent of Gross Revenue	Per Car Mile (Cents)
Passenger revenue	$270,551	95.78	......
Special car operation	16	.....	......
Revenue from transportation	$270,567	95.78	46.47
Station and car privileges	1,543	.55	......
Rent of tracks and terminals	9,632	3.42	......
Rent of equipment	694	25	......
Miscellaneous	50	...	......
Non-transportation revenue	$11,919	4.22	......
Gross revenue	$282,486	100.00	46.50
Cost of operation:			
Way and structures	21,754	7.69	3.575
Equipment	23,137	8.17	3.800
Overhead system	4,102	1.45	.674
Transportation	132,887	47.00	21.820
Traffic	6	.....	......
Power	57,447	20.38	9.440
General and miscellaneous	20,494	7.25	3.368
Expense of Street Railway Commissioner's office	742	.26	.122
Operating expenses	$260,569	92.20	42.86
Gross income	$21,917	7.80	3.64
Depreciation fund (*a*)	$3,542	......	......
Maintenance and repair fund (*b*)	360	......	......
Sinking fund	17,708	......	......
Taxes (*e*)	15,150	......	......
Interest on bonds (*c*)	40,000	......	......
Dividend on preferred stock (*d*)	3,333	......	......
Total deductions	$80,093	......	13.15
Net income from all sources	$58,176	......	9.51
Stabilizing fund balance Mar. 1 1921	$341,824	......	......
		Per Cent of Total	Per Car Mile
Revenue Passengers:			
Full fares at 6 cents	4,241,928	77.60	6.97
Children's fares at 1 cent	298,171	5.46	.49
Total revenue passengers	4,540,099	......	......
Transfers at 1 cent	851,344	15.60	1.40
Employees	75,849	1.39	.12
Total riders	5,467,292	100.00	8.98
Revenue per fare passenger (cents)	5.77	......	......
Revenue per revenue ride (cents)	5.02	......	......
Revenue per ride (cents)	4.95	......	......
Cost of operation per revenue ride (cents)	4.83	......	......
Cost of operation per ride (cents)	4.77	......	......
Revenue car miles	607,909	......	......

(*a*) Based on 0.5 per cent of capital value of $10,000,000.
(*b*) An allowance of 8 cents per revenue car mile credited to this fund. This figure represents over draft in fund
(*c*) $8,000,000 — 6% 1st Mortgage bonds outstanding.
(*d*) Preferred stock outstanding is $2,000,000 on 8 per cent basis.
(*e*) Two months charges due to ordinance requirements.

Results Better in Kansas City

Improved Efficiency With Reduced Personnel Contribute to Improvement There

Several items in the statistics of the Kansas City (Mo.) Railways indicate steady and marked progress during the past year and under the receivership, which has been in operation since September. During January, 1921, 15,431,572 passengers were carried, against 13,763,136 in January, 1920, including transfers, employees, and persons riding on passes. The figures for fares are for 1921, 10,425,502; and for 1920, 9,840,391.

The passenger revenue was $783,606 in January, 1921, against $725,021.10 in January, 1920. Costs have declined as receipts increased, despite the fact that larger amounts have been expended on maintenance and improvements. In January, 1920, for instance, $23,892 was spent on ways and structures, and $42,146 on this department in January, 1921. In January, 1920, power costs were $241,827 and in January, 1921, $210,155 although more cars were operated and more passengers carried.

FEWER EMPLOYEES

The reduced operating costs are reflected in the fact that in January, 1920, there were 3,900 employees, and in January, 1921, only 3,500 employees. In June, 1920, a voluntary wage increase was granted, amounting to about $500,000 a year on the basis of the number of employees then serving. Still labor costs in January, 1921, were $453,911, as against $466,000 in January, 1920. The increase in wages has therefore more than been offset in improved efficiency, permitting reduced personnel and less overtime.

One of the most interesting subjects of comparison is that of accidents and claims settled. There was an average of thirty-one accidents a day in January, 1920; and an average of twenty-two a day in January, 1921. The total number of accidents in January, 1920, was 957; while the total this year was 712.

The receivers have been setting aside $60,000 a month for claims; they have been settling every case immediately upon its arising, when possible—settling many more cases than the company had previously been able to dispose of proportionately to claims, and have accumulated a sum more than ample to meet the maximum demands, it is said, of pending liabilities.

Portland Notes Quickly Sold to Local Investors

Employees, customers and other individual investors not only absorbed the entire offering of $1,000,000 of 8 per cent five-year gold notes of the Portland Railway, Light & Power Company, Portland, Ore., in twelve days, but also piled up an over-subscription in the same period. The achievement is believed to be a record for the sale of local securities in the Portland district.

The average daily sales during the campaign aggregated over $90,000 and the total number of persons who purchased the gold notes is approximately 3,200.

The loyalty to and confidence in the company were displayed by the employees, nearly 70 per cent of whom bought a total of almost $400,000 of the notes.

Of the entire offering 90 per cent was disposed of in the immediate Portland district, the balance being scattered over the thirty odd communities receiving light, power and transportation service from the company.

One of the gratifying features of the campaign was the fact that nearly 70 per cent of the total sales were cash subscriptions and the wide distribution of the sales is shown by the fact that the largest individual order was for $7,500.

Results in Spokane Still Unsatisfactory

While the Washington Water Power Company's railway lines in Spokane were making a net profit of $78,970 during 1920 with the 6-cent fare, the traction lines of the Spokane & Eastern Railway & Power Company were losing a total of $144,029, according to the monthly reports submitted to the commissioner of public utilities.

The Washington Water Power Company was able also to set aside $174,600 from the year's receipts for depreciation. The Traction lines, operating at a loss, subtracted $14,649 for depreciation of property during the year.

Both companies are applying for an 8-cent fare.

The Water Power lines carried 20,500,075 passengers during 1920, while the Traction lines carried 9,274,743 passengers. The Water Power company made a profit of about one-third of a cent on each passenger. The Traction lines lost about one and one-third of a cent a passenger.

Heads of the two companies declare with equal emphasis that the 6-cent fare, in effect since April, 1919, has not solved their financial troubles.

Municipal Operation at Ten-Cent Fare Successful

The city officials of Ocean City, N. J., will apply to Chancellor Walker for the appointment of a trustee or receiver to operate the Ocean City Electric Railway during the coming summer season. The road has been operated during the past two seasons by a trustee appointed by the court. This was brought about by the company refusing to operate, after which the municipality petitioned the Board of Public Utility Commissioners to compel it to do so. The court then appointed a trustee and the municipality agreed to guarantee the cost of operation.

In the beginning the municipality guaranteed the cost of operation and maintenance only, any revenue over and above that amount to go to the bondholders. The first season there was very little left to divide among the security holders. The railway was finally allowed to increase the fare to 10 cents in each zone and last season the corporation earned and paid 6 per cent on the bonds, over and above operating expenses.

The permanent and summer residents of Ocean City agreed to the 10-cent fare in order that the road be kept in operation. The railway is the only one in New Jersey being operated by a municipality.

Financial News Notes

Will Abandon Belt Line.—The Public Service Commission has granted permission to the Belt Line Railway Corporation to discontinue service on its line on Tenth Avenue between Forty-second Street and Battery Place, New York. Business on the line has been steadily decreasing. The rails are to be removed by the company and the street repaved.

Dividend on Arrears Declared.—The directors of West Penn Traction & Water Power Company Pittsburgh, Pa., have declared the usual quarterly dividend of 1¾ per cent on the preferred stock, payable May 16, 1921, to stockholders of record May 2. The board also declared a dividend of 1¼ per cent on account of dividends in arrears accumulated upon its preferred stock prior to 1917, such dividend to be payable May 16 to stockholders of record May 2, 1921.

Brooklyn Receiver Would Resume Operation. — Lindley M. Garrison, receiver of the Brooklyn (N.Y.) Rapid Transit Company, has asked the Public Service Commission for permission to resume operation of the Park Slope line. Mr. Garrison intends, he says, to operate from Borough Hall to Park Circle during the morning and evening rush hours only. There will be no operation of the line on Sundays or holidays. The Public Service Commission has reserved decision.

Board of American Railways Increased.—At the annual meeting of the American Railways, Philadelphia, Pa., on March 17 the board of directors was increased from nine to twelve members. The new members are Charles F. Conn, James E. Gorman and Charles L. S. Tingley. The other members of the board are: Van Horn Ely, Lewis L. Dunham, John Gribbel, John J. Henderson, W. H. Lippincott, E. Clarence Miller, Charles R. Miller, Alexander C. Robinson and Thomas W. Wilson.

Valuation Being Made at Lynchburg.—The Lynchburg Traction & Light Company, Lynchburg, Va., recently made a valuation of its combined properties to be used as the basis of rate application. In order to confirm these figures the company is now having an independent valuation made by A. L. Drum & Company, Chicago. As soon as this work has been completed and the report submitted, the company expects to file its formal rate appeal, basing the increase asked on the need shown by each separate department of the service as disclosed by the appraisal.

Messrs. Stotesbury and Shelmerdine Out of P. R. T.—G. A. Richardson, vice-president of the Philadelphia (Pa.) Rapid Transit Company in charge of transportation, and Charles J. Matthews, president of C. J. Matthews & Company, leather manufacturers, Philadelphia, have been elected to the directorate to replace E. T. Stotesbury and W. H. Shelmerdine. The other directors re-elected by the Philadelphia Rapid Transit Company are Thomas E. Mitten, W. J. Montgomery, W. Y. Tripple, Frank Buck, W. C. Dunbar, and Jeremiah J. Sullivan.

City Restrained in Valuation Case.—Federal Judge C. W. Sessions at Memphis, Tenn., has granted an injunction restraining the city from collecting on more than 75 per cent of the total assessment against the Memphis Street Railway and other utilities. He held that the property of the utilities had been assessed on a 100 per cent valuation, while the appraisal of other real estate property was on a much lower basis. The complainants had already paid their taxes on a 70 per cent assessment basis. The new order by Judge Sessions means that they must now pay an additional 5 per cent. The Memphis Street Railway contended that it was operating on a service-at-cost basis, and that during the last six months the loss was $110,000. The opinion handed down by the court said that if the receivers were compelled to pay the disputed tax, which amounts to $71,250 the company would have to raise the rate of fare from 6 cents to 7 cents.

Another Bondholders' Committee in Brooklyn.—A protective committee of three has been formed by holders of Brooklyn, Bath & West End Railroad general mortgage 5s, dated Oct. 1, 1933, following a report of the Bank of America, trustee, on the application of the receiver of the Nassau Electric Railroad, Brooklyn, N. Y., to discontinue operation of the lines of the West End Company. The Brooklyn, Bath & West End is a predecessor company of the Nassau Electric Railroad. There are outstanding $121,000 of the general mortgage bonds which constitute a prior lien on property of the Nassau Electric Railroad. Retirement of the issue at maturity is provided for in the indenture securing the outstanding Nassau Electric first consolidated 4s, but since the institution of foreclosure proceedings on the Nassau mortgage, and the proposal of the receiver to discontinue operation on the West End line tracks, the formation of the committee was thought advisable by the trustee in order that the bondholders might be in a position to take concerted action as occasion might arise.

Traffic and Transportation

Louisville Appeal Heard

City Advances Contract Claim in Fare Controversy—Railway Contends City's Rights Are Regulatory

The appeal of the city of Louisville was heard by the United States Court of Appeals at Cincinnati, Ohio, on March 18 and 19. The case was carried to that court from the decision of Judge Walter Evans of the United States District Court of Louisville in connection with the injunction granted the Louisville Railway preventing the city of Louisville from interfering in the collection of a 7-cent fare. After hearing the appeal the court at Louisville adjourned until April 5.

The Court of Appeals did, however, order that in the interim the Louisville Railway issue receipts in the form of a stub on each strip of five tickets sold for 35 cents, this receipt to be held by passengers as a possible rebate voucher in the event the decision goes against the company. The company contended that to issue cash receipts with every fare collected would require a great deal of additional work and be very costly, but it indicated a willingness to co-operate by attaching rebate stubs to tickets.

The court further ordered that the company should give bond of $200,000 to secure receipt holders. In the event the company loses the suit the federal court will appoint a commissioner to supervise settling the receipt matters. The railway has ten days under the court order in which to arrange for issuing receipts, but the company reported that it would have receipts out within two or three days.

Six-Cent Fare Paid Voluntarily

The spectacle of car riders voluntarily paying a higher rate of fare than is called for in a franchise possessed by their city is being witnessed in Lakewood, Ohio, a suburb of Cleveland with a population of 41,000.

Lakewood has a franchise with the Cleveland Railway calling for a straight 5-cent fare or eleven tickets for 50 cents. This franchise is still in effect, but recently, under the service-at-cost franchise in Cleveland, it became necessary for the company to charge a 6-cent fare within the limits of Cleveland. Then for a month or more, Lakewood car riders enjoyed a longer haul for 5 cents than Cleveland riders were getting for 6 cents.

City officials of Lakewood said they would not stand for boosting the fare for Lakewood riders to that being paid by Cleveland riders, but the company announced a 6-cent fare for Lakewood riders, effective on Feb. 27, and since that time more than 95 per cent of Lakewood riders have been voluntarily paying the higher rate of fare. Officials of the suburb still say they will not formally sanction the increase and Fielder Sanders, City Street Railway Commissioner, admits that the company has no legal way of enforcing a rate of fare higher than a nickel.

Commodious Quarters for Bus Patrons

The city of Tacoma, Wash., will soon have one of the most convenient union bus stations on the Pacific coast. With this end in view the work of remodeling the building at Pacific Avenue and Eighth Street is now being completed. Motor buses for Olympia, Seattle, Puyallup, Sumner and other towns will load and unload their passengers there from an inside platform connecting with the ticket offices. Commodious waiting rooms will face the ticket offices. A restaurant and small shops will be located in the building. The bus station will be open to any bus company which wants to operate from it. The motorbus business in Tacoma has developed so rapidly during the last year that the move to make a union bus station in a central location became necessary.

State Seeks Control Over Interurban Fares

Recent advances in interurban fares in Texas have resulted in the State Attorney General being asked for an opinion as to the authority of the Railroad Commission over interurban lines. That official held that under the present state laws, the commission has no authority whatever over such fares. A bill has since been introduced in the House to give the Railroad Commission authority to regulate interurban fares.

Before this bill was introduced the commission called on the interurban companies for data and reasons for advances. Among the replies received was one from G. H. Clifford, vice-president and general manager of the Northern Texas Traction Company, Fort Worth. He stated the case for the interurbans succinctly. In concluding his remarks Mr. Clifford said that the situation affecting the interurbans was very different from that which existed some months ago. Service had to be provided now at greatly added operating costs. Moreover, there was no prospect of an early decrease in operating expenses. Traffic had decreased as a result of the abandonment of army cantonments, lessened activity in the oil industry and the general depression in business. He said that an analysis would show that even at the increased rates now in effect his company was not being compensated for service rendered.

One-Man Car Precautions

Massachusetts Commission Restricts One-Man Car Operation at Railroad Grade Crossings

The Massachusetts Department of Public Utilities has issued a drastic order governing the operation of one-man cars over steam railroad grade crossings. It is of especial interest to Massachusetts companies at this time, as the State Legislature has before it a bill sponsored by the labor interests to prohibit the operation of any one-man cars in the State because of the alleged danger to the public.

The grade crossing order of the Department of Public Utilities prohibits the operation of one-man cars across railroad grade crossings except where the crossing is protected by train crews, gateman or flagman, unless special authority is granted by the department. A safety stop is required at a distance of 75 to 125 ft. from the crossing, and another at a point just clear of the crossing. Installation of trolley guards is made compulsory.

The complete text of the order follows:

1. Unless authorized by the department, street railway cars operated by, or in charge of, one man shall not be operated over a railroad crossing at grade unless all engine and train movements over such crossings are required by the rules of the railroad, or by an order of the department, to be protected by train crews, or unless at the time the street railway car is operated over it such crossing is required by the rules of the railroad, or by an order of the Department, to be protected by a gateman or flagman.

2. Upon approaching a railroad crossing at grade the operator of a street railway car, operated by one man, shall bring it to a stop at not less than 75 and not more than 125 ft. from the crossing, for the purpose of making sure that the car is under control; then slowly advance the car to a point clear of the railroad track, where he shall again stop the car and ascertain if the way is clear before crossing; provided, however, that the second stop shall not be required at crossings of spur tracks where the rules of the railroad, or an order of the department, require all engine and train movements to be protected by train crews.

3. At all crossings with railroads at grade, except crossings where all engine and train movements are required by the rules of the railroad, or by an order of the Department, to be protected by train crews; there shall be maintained a trolley guard over the trolley wire constructed in such manner as to be connected with the power circuit, so that, in the event of the trolley wheel leaving the wire and being caught by the guard, power will be supplied to the car motors.

4. The foregoing rules shall not be considered as relieving street railway companies from maintaining special crossing protection required by specific orders issued by the department under the provisions of section 58 of chapter 159 of the General Laws.

5. The foregoing rules, with the exception of rule 3, shall be effective from and after April 1, 1921, and rule 3 from and after July 1, 1921.

Jitneys Ruled Off Railway Streets

The City Council of Kansas City, Mo., passed an ordinance on March 21 prohibiting the operation of jitneys on streets where electric railways now operate. The Mayor signed the order on March 22. A fund is being raised by the Jitney Owners' Association to contest the ordinance. The jitneys now operate over routes designated by the City Jitney Inspector. New routes must now be assigned away from car lines.

Eight Cents Asked in Spokane

A public hearing on the request for an increase in fares on the lines of the Washington Water Power Company and the Spokane Traction Company will be held in Spokane, Wash., by the State Public Service Commission the latter part of March or early in April. An 8-cent fare is sought. The present fare is 6 cents.

The Washington Water Power Company, in paving the way for the hearing, is using full page newspaper advertisements to tell the public the reasons underlying the request for increased fares. The initial advertisement was concluded as follows:

> The history of the street railways in Spokane is an open book. Not a shadow of suspicion has ever been cast upon the granting of the franchises. Not a hint has ever been heard of sharp practice in the organization of our company. Not a dollar of watered securities figures in our capitalization. Not a cent has been filched from any one under the guise of reorganization, or otherwise. Not a word of doubt has ever been uttered as to the integrity of public officials in relation to the street railways. Differences of opinion, it is true, have been expressed heretofore as to the justice or wisdom of certain requests. Such differences of opinion as may arise in the settling of the question at issue can be approached without rancor—on a plain, square business basis—free from animosity. and with the public taken into confidence as to every detail.
>
> It is with this spirit that we shall endeavor to show you as a citizen and property owner—whether you ride upon the street cars daily or very seldom—that an increased fare is not only just, but necessary. And in support of our contention we shall present to you, in simple form, a statement of our operating expenses and our income. We shall show what becomes of the fare that you pay us. We shall show you what other northwestern cities have done. We shall show you, in a word, how your own interests will be best advanced by the establishment of an 8-cent fare in the city of Spokane.

Ithacans to Pay Eight Cents

The Ithaca (N. Y.) Traction Corporation has been granted permission to increase its fares in all municipalities in which it operates from 7 cents to 8 cents. Some time ago the company applied to the Public Service Commission for authority to charge 10 cents, submitting statements to prove that the 7-cent fare was insufficient to yield reasonable compensation for the service rendered. There was a good deal of opposition to the advance in fares. Commissioner Irvine in announcing the decision stated that a 10-cent fare was not necessarily the solution to the traction problem, and that only what was imperatively required would be granted the company. In making a decision Mr. Irvine said that the patrons' welfare had to be considered. The recent ruling gives the company permission to charge an 8-cent fare on all lines in Ithaca, Cayuga Heights and the town of Ithaca with the exception of the East Ithaca line.

Courtesy Promotes New Business

Every official of the railroad department of the Monongahela Valley Traction Company, as well as heads of other departments of the same big local concern were present at a dinner given recently in the Y. M. C. A., Fairmont, for the purpose of complimenting the officers and the men in the various departments for the splendid manner in which they handled the crowds occasioned by the recent Billy Sunday tabernacle meetings in Fairmont, W. Va. Captain Alexander, president of the company, expressed the belief that the Sunday meetings would not have proved the success they were had not the traction company been able to bring from a distance the 33,000 people it handled to and from the tabernacle. Mr. Alexander spoke further of the future of the railway, the creation of new business and courtesy as the cheapest means of acquiring new patronage.

"Courtesy," said the captain, "is the cheapest service that our motormen and conductors can offer the public. It is just as easy to give it as to refuse it. I ask you officials to impress upon the men under you the absolute necessity of extending courtesy on all occasions."

Through Indianapolis-Louisville Service Celebrated

The Interstate Public Service Company, operating between Indianapolis and Louisville, will put into service soon its new limited trains between the two cities. Harry Reid, president of the company, announces that seven trains each way will be operated when the new schedule is completed.

Seventy business men of Indianapolis and the cities along the interstate lines went to Louisville recently to return the call made a week before by representatives of civic and commercial bodies of Louisville and other cities along the route. The Hoosiers made the trip in one of the Interstate's new steel trains as the guests of Mr. Reid, L. M. Brown, superintendent; Bert Weedon, passenger and freight agent, and Ira Guthrie, auditor. The tourists returned to Indianapolis in the afternoon.

Charles S. Henry, who, in 1898, brought the first electric interurban car into Indianapolis over the Indiana Union lines and now operating head of the Indianapolis & Cincinnati Traction Company, was an interested observer of the operation of the new interstate trains. On both the outbound and return trips, Mr. Henry, with watch in hand, timed the train and frequently announced the time in excess of 60 m.p.h.

Bus Legislation Before Council

Jitney regulating legislation lies slumbering in the Council at Toledo. The jitneys have slashed their fares from 6 to 5 cents as an answer to the educational campaign of the railway to discourage riding in jitneys at the peril of higher fares on street cars under the service-at-cost plan.

The ordinance, which has been prepared by a special subcommittee of Council to regulate the buses, provides for a license fee of from $150 to $300 and an indemnity bond ranging from $15,000 to $30,000, depending upon the size and capacity of the bus.

Utah Ranks Second in Electric Mileage per Capita

With three electric railroads extending from Preston, Idaho, to Payson, Utah, 70 per cent of the population of the State of Utah lives in the territory through which the Utah portion of this unbroken line of electric railroads passes. Recent figures compiled under the direction of Ross Beason, traffic manager of the Salt Lake & Utah Railroad, which runs from Salt Lake City to Payson, Utah, show this fact. It is also shown that Utah is the second state in the Union from the standpoint of mileage of electric lines per capita. California ranks first, with 11.4 miles of track for each 10,000 persons. Utah has 10.1 miles of track for every 10,000 inhabitants.

During 1920 the Salt Lake & Utah Railroad carried about 900,000 passengers, or an average of more than 2,500 passengers a day for a distance of 18 miles. On this basis the average daily passenger train mileage is equal to the distance from Omaha to Chicago, and the passenger train mileage of all the electric lines in Utah will average a daily mileage equal to the distance from New York to San Francisco, according to Mr. Beason.

LARGE INCREASE IN FREIGHT TRAFFIC

From a few hundred cars of freight handled during the first year's operation of the Salt Lake & Utah, in 1914 and 1915, that road has increased its freight traffic until last year it handled 9,036 cars. This does not include 22,000,000 lb. of less than carload shipments carried between merchants of Salt Lake, Provo and other points on the line. During the first year's operation the less than carload shipments totaled 10,000,000 lb., representing an increase of more than 50 per cent in this line.

With a monthly payroll of practically $34,000, this road now operates over a total of 92½ miles of track, 67 miles of which is main line, 9 miles of branch line and the balance in spurs and sidetracks.

BUSINESS HAS THRIVED

Over this trackage is operated daily about 130 steel, coal and freight cars, drawn by six electric locomotives, exclusive of the passenger cars, all of which is owned by the road. On this property, lying all within the State of Utah, taxes to the amount of $50,000 are paid yearly. The property is owned and controlled by local citizens and interests.

During the brief period of its existence there have been sixty-one industries and manufacturing enterprises organized and now being operated in the territory through which this road passes. Among the plants that have come into existence have been four sugar factories, six canning factories, several lumber and coal yards and a number of wholesale and jobbing houses.

Transportation News Notes

Up-State Railway Wants Fare Rise.—The Elmira, Corning & Waverly Railway operating an interurban line connecting Elmira, Waverly and Corning, N. Y., recently petitioned the Public Service Commission for permission to increase its one-way fares 33⅓ per cent. In addition the company wants to discontinue all round-trip fares and cancel transfer privileges as now existing.

Increased Rates Refused. — The Pennsylvania Public Service Commission has denied the application of the Johnstown (Pa.) Traction Company to increase its fares from 7 cents to 8 cents with a ticket fare increase from four for 25 cents to four for 30 cents. In accordance with the new ruling the company will continue to charge a 7-cent fare, but it will have the privilege of selling four tickets for 28 cents or five for 35 cents instead of the present four for a quarter.

Fare Boxes in San Diego.—All cars of the San Diego Electric Railway have been equipped with fare boxes for the collection of fares, effective March 10. Previously the fares were paid directly to the conductor by the passenger. The new rules require the passenger to deposit the fare in box. At the same time metal tokens replaced the printed tickets for full fares through outer and inner zones. The metal tokens sell for the same price as did the tickets, four for 30 cents. The changes are expected, company officials state, to improve the service and speed up schedules.

Intrastate Tariff Filed. — Traction companies operating in Indiana filed a petition with the Public Service Commission on March 11 for a new schedule of through intrastate interurban fares. Officials connected with companies filing the petition stated that it is for the purpose of adjusting through tariffs to the present rate. It will result in an increase in rates over some of the existing through tariffs, according to officials. In all cases the lowest local fares have been used, however, in computing the through rate.

Increased Rates Suspended.—The Interstate Commerce Commission has recently ruled that the proposed new rates on the Washington-Virginia Railway, Washington, D. C., which were to have been effective on Feb. 13 be suspended for four months. Last April the price of twenty-trip tickets good for a period of two weeks was increased from $2.70 to $4. The road now seeks to increase the price of the round-trip from 38 to 48 cents and to increase the price of the monthly or fifty-two-trip book of tickets from $4.46 to $5.50.

Wants Higher Rates in Lynchburg.—The Lynchburg Traction & Light Company, Lynchburg, Va., will apply to the State Corporation Commission for increased railway rates as soon as the valuation of the property has been completed. J. N. Hancock, general manager, states that the company operating so long on pre-war rates has found it imperative to seek relief. In addition, he says that the company has been compelled to borrow money for certain improvements and now faces the necessity of raising still further sums.

Will Resume Line With Extra Fare.—Public Service Commissioner Barrett has granted permission to Lindley M. Garrison, receiver of the Brooklyn, Queens County & Suburban Railroad to resume operation on the Metropolitan Avenue surface line to Jamaica Avenue with an extra 5-cent charge between Jamaica Avenue and the Metropolitan Avenue station of the Myrtle Avenue elevated. The receiver's application for resumption of this line was referred to in the ELECTRIC RAILWAY JOURNAL, issue of March 12.

Increased Passenger Rates Sought.—The Indianapolis & Louisville Traction Railway, the Interstate Public Service Company, the Louisville & Southern Indiana Traction Company and the Louisville & Northern Railway & Lighting Company, operating lines in southern Indiana, filed petitions on Feb. 28 in the offices of the Public Service Commission asking for an increase of passenger rates from 2¾ cents a mile to 3 cents a mile. The petitioners say in each case "that with the exception of your petitioner and affiliated companies all interurban electric lines within the State of Indiana are receiving not less than 3 cents a mile as their established passenger fare rates."

Temporary Fares Continued Until 1922. — The British Columbia Electric Railway, Vancouver, B. C., has opened negotiations for new franchises with the cities of Vancouver, North Vancouver and New Westminister and the Municipalities of Point Grey, South Vancouver and North Vancouver district. A temporary agreement permitting the present fares to be charged until June 30, 1922, has been signed and the company has withdrawn its application for a Dominion charter which would have taken the control of the company out of local or provincial authorities. Under the temporary agreement, new franchises must be signed before August 31, 1921, otherwise the company will be at liberty to renew its application for a Dominion charter. The company is at present charging 6 cents on its city lines with a 7-cent commutation rate to suburban zones.

Fare Decrease Protested in Washington.—The Capital Traction Company Washington, D. C., has filed with the Public Utilities Commission a petition to prevent the rate of fare on that system from automatically going back to 5 cents with a 2-cent charge for transfers on April 1. George E. Hamilton, president, does not say definitely in the petition what rate of fare his company needs. He emphasizes two points: (1) That the Capital Traction Company could not operate under present conditions with a 5-cent fare and 2-cent charge for transfers, (2) that it would be unwise to establish separate rates of fare for the two companies if investigation shows that the Capital Traction could get along with a rate lower than the Washington Railway & Electric Company requires.

Application for Increased Rate Denied.—The Public Service Commission for the Second District of New York has denied the application of the Empire State Railroad to charge 10 cents in Oswego. In October, 1919, the company was permitted to advance its passenger rates from 5 cents to 7 cents. In that same order of the commission the company was allowed to operate one-man cars. It was not until September, 1920, eleven months after the authorization by the commission that the new schedule went into effect. This delay was occasioned by a controversy over the operation of the one-man cars without which cars the company did not care to put into effect the new schedule, and further on account of the destruction of some of its equipment by fire. Two months after the new rates went into effect the company applied to the commission for an increase in fare. The commission in denying the petition states that the 7-cent rate was based upon so short an experience, and now when other costs of living are diminishing it would not seem advisable to fix a higher rate.

New Fare Schedule Filed.—The New Jersey & Pennsylvania Traction Company, Trenton, N. J., announces that a 10-cent fare will be put into effect on the lines in Pennsylvania beginning April 12. The present rate is 8 cents. It is proposed to sell five strip tickets for 35 cents from Trenton to Morrisville, Pa., but cash fare will be 10 cents on all lines. On the Yardley and Newton division the fare will be 10 cents cash or eleven tickets for $1. Riders on the Lambertville division will actually have their rate reduced, if tickets are purchased. There will be a saving of 10 cents if tickets are bought. The tariff schedule has been filed with the Pennsylvania Public Service Commission at Harrisburg, Pa., and the Interstate Commerce Commission at Washington, D. C. Although no change was expected in the 7-cent schedule between Trenton and Princeton, the company has recently applied for a 10-cent fare in each of its four zones between these two cities. The old utility board denied the company's petition to charge 8 cents. The board later issued an order suspending the proposed increase. In the meantime an inquiry will be made into the reasonableness of a 10-cent fare. The company wants the new rate to go into effect on April 12, when 10 cents will be charged on the divisions in Pennsylvania.

Personal Mention

J. R. Bibbins, Manager

Former Arnold Man Will Direct Recently Created Department of Transportation and Communication

James R. Bibbins, who has been a personal representative of Lieutenant-Colonel Bion J. Arnold, consulting engineer and president of the Arnold Company, Chicago, has been picked to manage the new department of transportation and communication, the creation of which was recently announced by the Chamber of Commerce of the United States. This department is one of the eight into which the chamber has been divided. Its range of activities will cover shipping, ocean and inland; steam and electric railroad transportation; air transportation, cables and telegraph; postal facilities and highways.

Mr. Bibbins brings to the new department a wide experience derived in consulting work, dealing with transportation problems of some twenty cities in the United States and Canada. He has had to do with rapid transit problems, railroad and port terminal activities, and civic development. He has studied the terminal problems of New York, Chicago, Baltimore, New Orleans, the transit plans of Chicago, San Francisco, Pittsburgh and other cities, and the valuation of property in New York, Brooklyn and Chicago.

MR. BIBBINS HAS WIDE EXPERIENCE

Mr. Bibbins has also had a wide experience in manufacturing and construction work. In 1902 he became associated with the Westinghouse Machine Company in East Pittsburgh, Pa., as a commercial engineer. During his connection with the Westinghouse interests his work included an intimate association with the development of prime movers, including gas engines, producers, turbines and condensers. Previously he had served in various technical capacities with the Detroit Public Lighting Commission, the Detroit Edison Company, and with the Detroit United Railway in operating and construction work. In 1909 Mr. Bibbins became associated in the work of the Public Service Commission of New York as assistant to Mr. Arnold, who at that time was a consulting engineer and director of appraisals on the commission. Mr. Bibbins was educated in Baltimore City College and the University of Michigan. He is a member of numerous engineering societies.

The chamber has long been active in transportation affairs. As a contribution of value to the railroad situation the chamber, in the latter part of 1918 and 1919, held a national transportation conference, bringing together all of the interests concerned with transportation. The results of this conference, together with the result of a referendum vote of the chamber's membership on proposals for rehabilitation of the roads, were laid before Congress, which at that time was considering railroad legislation.

Mr. Reynolds in Youngstown

Former St. Paul Man Appointed General Superintendent of Youngstown & Suburban Railway

A. L. Reynolds was appointed general superintendent of the Youngstown & Suburban Railway, Youngstown, Ohio, by the Municipal Service Company, whose service he entered on March 1. Mr. Reynolds has been foreman of the Snelling car station of the St. Paul City Railway. He was in the operating department of the Twin City Rapid Transit Company there for about twelve years.

A. L. REYNOLDS

Mr. Reynolds began his railway training in the operating department of the Northern Ohio Traction Light & Power Company in 1907. The following year he took a position as a salesman with the B. F. Goodrich Company, and after remaining with that concern for a year again took up railway work with the operating department of the St. Paul City Railway as supervisor of transportation. Before the entrance of the United States into the war in 1917 Mr. Reynolds went to the Second Officers' Training Camp at Fort Snelling, Minn. He received there a commission as first lieutenant in the infantry.

Upon his return to civil life in 1918 he became identified with the Minneapolis (Minn.) Street Railway. During the latter part of 1918 he conducted for the company many public meetings in connection with its campaign to explain to the people the cost-of-service franchise which the company was seeking to obtain from the city. This measure was defeated, but its failure to pass was ascribed to the limited time the voting public had prior to the election in which calmly to consider the matter rather than to any inherent defects in the measure itself.

In 1919 Mr. Reynolds was again transferred to the St. Paul City Railway by the Twin City Rapid Transit Company, and while with that company he acted as supervisor and also in various other capacities.

Mr. Reynolds was born in 1886 in Ashland, Ohio. He received his education in the grade schools of Akron, Ohio, and later attended Kenyon Military Academy at Gambier, Ohio. He is a graduate of Kenyon College, also in Gambier.

Paul Shoup Honored

Paul Shoup, president of the Pacific Electric Railway, Los Angeles, Cal., and vice-president of the Southern Pacific Company, San Francisco, Cal., was presented by a group of intimate friends with a life-size painting of himself at a dinner given in his honor at the Hotel St. Francis in San Francisco on Thursday, March 10. The portrait is the work of Arthur Cahill, who has painted the portraits of many eminent men.

William Sproule, president of the Southern Pacific Company, made the presentation address. Others who paid tribute to Mr. Shoup were Julius Kruttschnitt, chairman of the executive committee of the Southern Pacific Company; William Clayton, vice-president of the Spreckels companies of San Diego; Harry Chandler, president and general manager of the Los Angeles *Times;* William F. Herron, vice-president and chief counsel of the Southern Pacific Company; Herbert Fleishhacker, and C. W. Durbrow, attorney for the Southern Pacific Company. The dinner was attended by practically all the officials of both the Pacific Electric Railway and the Southern Pacific Company besides numerous other friends of Mr. Shoup in the industry.

Messrs. Esch and Potter Appointed to I. C. C.

John J. Esch and Mark W. Potter were nominated on March 11 by President Harding for appointment to the Interstate Commerce Commission.

Mr. Potter has been serving on the commission under a recess appointment by President Wilson. He has been very active in the work of the commission, having had charge of that branch which dealt particularly with the financial matters within the commission's jurisdiction. Mr. Potter's nomination was confirmed by the Senate on March 12. His term ends Dec. 31, 1923.

Mr. Esch, who has been chairman of the House committee on interstate and foreign commerce, was appointed for the full term of seven years to succeed Robert W. Woolley, whose term expired on Dec. 31. Mr. Esch has manifested a special interest in railroad and transportation affairs in Congress and has played a very active part in the framing of railroad legislation.

Under the plan of rotating chairmanship, the usual change in the chairmanship of the commission will not take place in March this year but at the end of June, when ordinarily fewer cases are before the commission.

Jersey Senate Finally Confirms Commission Appointments

Governor Edwards of New Jersey on March 21 sent to the Senate for confirmation the names of Judge Harry V. Osborne and former Judge John J. Treacy, Democrats, to be members of the Public Utility Commission, to replace the nominations of James A. Hamill and Joseph S. Hoff, two Democrats whose names the Senate rejected. The nomination of Harry Bacharach, Atlantic City, the only Republican suggested originally by the Governor, has been confirmed by the Senate. The Senate in executive session also confirmed the nominations of Messrs. Osborne and Treacy.

Judge Osborne came into prominence in 1908, when he won the Democratic nomination for State Senator in Essex County and was elected, although he ran in the primaries as an independent Democrat. He served a term of three years, and in December, 1911, he was appointed to the Essex County bench by Governor Woodrow Wilson, where he has since continued to serve, having been reappointed in 1913 and again in 1918.

Mr. Treacy was graduated from St. Peter's college in 1891 and entered the New York law school the following year. He received the degree of bachelor of laws in 1894 and in 1895 was admitted to the New York bar, where he became associated with the firm of Reed, Simpson, Thatcher & Barnum, of which the late Speaker Thomas B. Reed was the head. He was admitted to the New Jersey bar in 1901, and has practiced his profession in Jersey City since that time. He was a member of the Assembly in 1902 and 1903. He was appointed judge of the Court of Errors and Appeals by Governor Wilson on Dec. 8, 1911. In 1913 Mr. Treacy resigned from the judgeship. In 1914 he was appointed a member of the Public Utilities Commission.

Messrs. Brooks, Jr., and Ives Advanced at Detroit

Frank W. Brooks, Jr., former assistant general superintendent of the Detroit (Mich.) United Railway, has been appointed assistant to the president and general manager for that company to succeed W. E. Cann, who resigned recently to become Street Railway Commissioner at Toledo, Ohio.

Edward H. Ives succeeds Mr. Brooks as assistant general superintendent of the company at Detroit.

Mr. Dana, President

Manager of Boston Elevated Elected Head of New England Street Railway Club

Edward Dana, general manager of the Boston (Mass.) Elevated Railway, was elected president of the New England Street Railway Club at its annual meeting held in Boston, Mass., on March 22. Mr. Dana succeeds I. A. May, comptroller of the Connecticut Company, New Haven, Conn. Mr. Dana is widely known in the electric railway field and is recognized as a specialist in transportation practice. The club may well be congratulated on having chosen a man of such proved ability to take the initiative in making the club of most value both to the industry and its members.

Mr. Dana was born in Bernardston, Mass., in 1886. He took a preparatory course at Stone's School, Boston, and completed his academic course in Harvard in three years, graduating in 1907. Shortly after receiving his degree he entered the employ of the Boston Elevated Railway as a conductor and since that time has had experience in nearly every department of the road.

EDWARD DANA

He became particularly interested in the scientific aspects of transportation and has made extended trips throughout the entire country in connection with railway problems. He is a very frequent and valuable contributor to the ELECTRIC RAILWAY JOURNAL, his articles dealing principally with detailed analyses of the various phases of transportation.

Mr. Dana has been prominent in the deliberations of the American Electric Railway Association, where he is considered an authority on transportation matters. He has also testified as an expert witness for the Interborough Rapid Transit Company before the Public Service Commission.

The rise of Mr. Dana to general manager of the Boston Elevated was exceptionally rapid. After gaining much practical experience as a conductor, he was made assistant to the superintendent of transportation and soon afterward became traffic superintendent. Having been transportation manager in charge of elevated and surface lines for several years, on August 8, 1919, he was selected as general manager by the Board of Public Trustees.

Mr. Moran Conducting a Publicity Campaign in Illinois

John J. Moran, of the Chicago, North Shore & Milwaukee Electric Railroad, Highwood, Ill., is traveling over the State of Illinois in the interests of the Illinois Committee on Public Utility Information. Mr. Moran is speaking before the Chambers of Commerce, the industrial organizations, men's and women's clubs, and before students in universities, colleges and the larger high schools.

It is the idea of Mr. Moran and of the Illinois Committee on Public Utility Information to inform the people of the real facts about electric railway investments in the United States. The people are also told the part which the railways take in the economic development of the country by citing the number of passengers and the amount of freight which they carry, and the number of men which they employ. It is hoped that the public by this method of education may be brought to appreciate the point of view of the railways in order that co-operation and good will may exist between them for their mutual benefit.

Mr. Armstrong Promoted

E. E. Armstrong, for the past two years general superintendent of the City Light & Traction Company, Sedalia, Mo., has been transferred to the Meridian Railway, Light & Power Company, Meridian, Miss., by the Doherty interests to hold a like position. Mr. Armstrong, in assuming his new duties, will be under General Manager W. B. Malone, at one time in charge of the commercial department of the City Light & Traction Company. No successor has yet been announced for Mr. Armstrong's place.

During the two years that Mr. Armstrong has been in Sedalia he has proved a most capable official and has made many personal friends in business and other circles. Previous to going there he was in service in the World War and before that time had been employed with the Doherty interests at Denver, Col., and at Bartlesville, Okla. For a time he was in the New York offices of the Doherty company.

N. K. Smith Made Superintendent

N. K. Smith, formerly trainmaster of the Indiana Service Corporation, Fort Wayne, Ind., has been appointed superintendent of the Fort Wayne, Van Wert and Lima line of the Ohio Electric Railway. His appointment was recently announced by S. W. Greenland, general manager for the receiver of the Fort Wayne-Lima line. Mr. Smith will locate in Van Wert and will be in active charge of the operation of the road.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER.
SALESMAN AND PURCHASING AGENT
ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Good Stocks of Rattan Car Seating Material

Present Prices Represent Ten to Fifteen per Cent Reduction from Peak—Rattan Cost Unchanged

Though there has been no price change in the car seat market now for several weeks present quotations of rattan car seating material represent manufacturers' reductions of from 10 to 15 per cent compared with peak prices. At the same time rattan for snow sweepers was reduced about the same amount. Finished rattan seats for electric railways have been reduced slightly since the first of the year, but prices of seats furnished to steam roads remain at their peak. There is keen competition among buyers of rattan in the Far East at present, for demand is said to be strong from a number of sources other than the railway industry, and foreign countries are buying more of this material now too. Consequently the cost of rattan is as high as ever.

Ship bottoms are plentiful and car seat manufacturers here can obtain a supply of rattan in approximately three months. A sizable reserve supply is kept on hand sufficient to insure stock deliveries of repair material at the present time. The favorable delivery situation is further augmented by the light buying of steam and electric lines. A fairly good volume of business still remains from orders placed some time ago, and manufacturers are hopeful that this will tide over production on a curtailed basis until the looked-for improvement in demand materializes.

Railway Material Prices in England Show Large Increase Since 1914

To those familiar with the big increase in cost of virtually all material used by electric railways since before the war, the following table affords an interesting basis of comparison with the cost increase along kindred lines in England. The figures are prepared by the manager of the West Ham Corporation Tramways, England. The percentage of price increase for fifteen items in 1918, 1919 and 1920 over prewar prices is presented. The table is similar to one appearing on page 1287 of the June 19, 1920, issue of ELECTRIC RAILWAY JOURNAL, covering the price at that time of 52 items used by traction companies in this country, in relation to existing prices in 1914 and 1919. Of the eight items which appear in both tables, the average percentage of price increase in 1920 over 1914 is 127 per cent in this country and 184 per cent in England.

	1918 Per Cent	1919 Per Cent	1920 Per Cent
Axles	100	226	196
Tires	156	206	283
Gear wheels	80	175	175
Pinions	233	350	216
Trolley wire	85	100	33
Motor grease	150	216	176
Oil light journal	236	250	240
White lead	100	140	255
Bolts and nuts	165	226	274
Span wire	120	180	180
Tickets	143	157	200
Trolley wheels	73	80	80
White metal	66	83	89
Timber	60	70	75
Print'g and stationery	250	350	350

Stock Deliveries of Paint

Electric Railways Showing Little Interest in Spring Painting Market

Buying of paint by electric railways thus far this year has been negligible. Traction companies are not only avoiding stocking this material but they have also given little indication that there will be the usual amount of spring painting of cars done this year. There is some buying for immediate needs, it is true, and this combined with general demand has provided a fairly good volume of current business, several producers report. Optimism is quite generally expressed to the effect that total sales this year will equal the figures of 1920, as the general expectation is that demand even from steam and electric railways will increase considerably before long. Paint producers think that difficulty in readjusting wage scales on the part of both electric and steam lines is an important factor in delaying buying.

Stocks of finished paint in general are not large for production in a number of instances has been curtailed to a point commensurate with buying. The surplus supply is adequate, however, to insure present delivery from stock in virtually all instances.

Prices on paints used by electric railways have declined anywhere from 25 to 50 per cent compared with peak quotations. There has been no general reduction for more than a month, however, and several manufacturers state that in their opinion the market has hit bottom. On the other hand, it is admitted there is some slight room for lower costs through wage readjustments, but this will not be felt for quite some time.

White lead in oil in 100-lb. kegs, lots of less than 500 lb. is today quoted at 13 cents New York, compared with 14¼ cents on Dec. 1, 1920; raw linseed oil in 5-bbl. lots is worth 68 to 69 cents per gallon compared with 85 cents on Dec. 1, 1920; and turpentine in barrel lots is quoted at 58 cents per gallon compared with 95 cents on Dec. 1, 1920. Varnish gums have declined about 40 to 60 per cent from their peak prices.

Heavy Declines in Scrap Steel Prices

There Is Little Activity in the Market, However, and Quoted Prices Do Not Represent Real Values

With the low prices prevailing there is little incentive for railways to sell their steel and iron scrap except to get rid of stock or to realize what can be realized on the transaction. The market is very quiet, with here and there a sale reported. Dealers feel that this scrap is a good investment at the present time and that general prices can go little lower. They see a quick return to higher prices when the demand for scrap does set in though, regardless of the uncertainty as to when that time shall come. As has been the case heretofore, this demand will be felt directly after that in the steel trade shall set in.

Quoted prices are felt to reflect no true condition of the value of steel scrap but merely the figures at which railroads, etc., will release their materials. There is little scrap coming from new manufacturing. The steel mills are not using much of the material under their curtailed operation but railroads are taking every advantage in reclaiming springs, bolts, axles, etc.

RAILROADS LARGELY GOVERN PRICES

Prices even since Jan. 1 show extensive reductions. For instance, in the Chicago market old steel axles are off $2.50 to $14.50-$15.00; old iron axles are off $3.50 to $26.50-$27.50. Steel springs show a $4.50 drop to $13.50-$14.00, while machine shop turnings are off 50 cents to $5.50-$6.00. These are all for net tonnages. In gross ton lots since Jan. 1 car wheels are $7 lower to $14.00-$14.50; railroad malleable $2.40 to $15.50-$16.00; frogs, switches and guards are off $2.50 to $12.00-$12.50, and old steel rails, short, are $1 low to $13.00-$13.50. It is felt that some of this material, notably old rails, could be purchased under these figures, but there seems to be insufficient storage space with the dealers to purchase large amounts to hold in storage for any considerable time awaiting a market return.

Heavy tonnages of scrap have been sold by the Pennsylvania Railroad Company since the first of the year at quoted prices on the days of sale.

Electric Railway Proposed in Norway

The commercial secretary to his Majesty's Legation at Christiania, according to the London *Electrical Times*, states that the Norwegian Government has granted a concession to "A/S Akerabanerne" to construct an electric railway from Majorstuen through Taasen to Sognsvandet, and from Taasen to Sagene, a suburb of Christiania. Preliminary work in connection with the grading of the proposed route will begin at once. Tenders will not be issued until the end of the present year. Application has recently been made to the Norwegian Government by "A/S Akerabanerne" for a further concession in connection with a proposed railway from the center of Christiania to Ostensjo, a distance of about eight kilometers. If the latter concession is granted it is proposed to construct both lines simultaneously.

Wire Production Curtailed Under Light Demand

Prices Ruling on All Classes of Bare and Insulated Wire Are at Extremely Low Figure

Manufacturers report that demand for insulated wire is quiet. Jobbers are still for the most part endeavoring to get rid of supplies on hand, contractors have not much to do except small repair jobs, the promise offered by a return of the building industry yet hangs some months off on the horizon and utilities are short of money. For these reasons producers apparently do not expect a return of strong demand in the near future. Production is considerably curtailed, operation at from 50 to 75 per cent of capacity being about the general average. Stocks are gradually piling up, however, and deliveries are prompt, with shipment from stock up to a matter of two weeks prevailing.

PRICES REFLECT EXTREME LOW LEVEL OF RAW MATERIALS

Prices are thought to have reached rock bottom as copper, cotton and rubber are all about as low as they can go, it seems, while wage reductions have also been made to some extent. Consumers in many cases admit that present wire prices are attractive but say that money conditions prevent their stocking up. A carload lot of No. 14 rubber-covered wire is quoted by several representative producers at from $7.50 to $7.75 per 1,000 ft., but it is known that these quotations have been cut considerably by smaller producers. An average base working price for weatherproof wire at the present time would probably be about 16 cents, though most manufacturers are not quoting base prices.

Bare-copper wire business presents much the same conditions as does insulated wire. Utilities are buying some but not much, and demand from electric railways is very largely only for repairs. The finer sizes of bare wire, which last summer were so hard to obtain, are now even in less call than the large sizes, and stranded wire, as demand for purposes such as small motor manufacture, is especially slow. There is considerable optimism, however, regarding prospects of present conditions improving. Deliveries of bare copper wire are all that can be desired, as orders are filled in about ten days to two weeks. A representative base price would be about 14½ to 15 cents.

Manufacturer of Gear Cases Again Reduces Price

One of the large manufacturers of sheet steel gear cases has reduced the price on this product approximately 5 per cent effective March 15. So far as can be learned other producers have not followed this company's example in again reducing prices. The reduction mentioned above follows a cut of 7 per cent made by this company early in January. Other manufacturers soon after that followed suit with reductions of about 10 per cent on both sheet steel and malleable iron gear cases, the price decreases taking effect the middle of January and the early part of February in different instances.

Present demand is not large and although deliveries are prompt several manufacturers report that they are not carrying overly big stocks. This is perhaps due to a feeling that prices of the raw material have not yet reached rock bottom.

Westinghouse Drops Price of Small Supply Items

Effective on March 10 the Westinghouse Electric & Manufacturing Company has again reduced prices on the 60,000 to 80,000 supply items contained in catalog 10-A. The reduction varies, but averages on the whole about 6 per cent. Included in the items affected are commutator and controller copper parts, resistance grids, armature and field coils, brush holders, transformer replacement parts and parts for electrical machinery in general.

Rolling Stock

Centralia (Ill.) Traction Company has purchased four standard double-end safety cars from the National Safety Car & Equipment Company, St. Louis, Mo.

Wisconsin-Minnesota Light & Power Company, Eau Claire, Wis., has purchased four standard double-end safety cars from the National Safety Car & Euipment Company, St. Louis, Mo., for use in Eau Claire.

Tidewater Southern Railway, Stockton, Cal., which operates between the cities of Stockton, Modesto and Turlock, Cal., has purchased a 60-ton electric freight locomotive from the General Electric Company. Delivery is to be made early in the summer in time to handle the crop movements which make up a considerable portion of the freight business on this line. The company has pending before the California Railroad Commission an application for the issue of $49,000 of first mortgage 5 per cent gold bonds for security on a promissory note to be applied on the purchase of the new locomotive.

Franchises

Ontario, Canada.—Representatives of the municipalities of Galt, Preston and Kitchener have asked the Ontario government to open the way for Galt and Kitchener to enter into agreements between the municipal corporations and the Grand River Railway, a subsidiary of the Canadian Pacific Railway, for an extension of the existing franchises. Under the old Beck act the municipal councils can give an extension only for a year without a vote of the people, and under the agreements signed in connection with the Elmira, Galt, Preston and Hamilton radial system such an extension is further made subject to the Ontario Power Comission sitting as a court and hearing the views of other interested municipalities. Premier Drury promised consideration.

Track and Roadway

Phoenix (Ariz.) Railway. — The Phoenix Railway has begun work on the various improvements ordered by the commission. The crossings at Tenth Street, Willetta and Brill Streets have been paved. The commission outlined an improvement plan some time ago with the condition that if the company failed to do the necessary work the city would start the work and bill the company. The city was about to begin the work when the railway started paving.

Pacific Electric Railway, Los Angeles, Cal.—The Pacific Electric Railway will put in new rail, ballast and paving on South Mt. Vernon Avenue, San Bernardino at a cost of $33,000.

Indianapolis (Ind.) Street Railway.—The Indianapolis Street Railway will be asked to make many extensions to its line according to George Lemaux, president of the Indianapolis Board of Public Works. The following are proposed: Extension of College Avenue line from Forty-sixth to Fifty-first Street; removal of tracks of Meridian Heights line now in Forty-ninth Street from Pennsylvania Street to College Avenue and relay them in Pennsylvania Street from Forty-ninth Street to Fifty-second; extension of Illinois line from Thirty-ninth Street to Forty-sixth.

United Railways & Electric Company, Baltimore, Md. — The United Railways & Electric Company has extended its St. Paul Street line from Thirty-first Street and Greenmount Avenue over the Gorsuch Avenue route.

United Railways & Electric Company, Baltimore, Md.—The United Railways & Electric Company has received petitions urging better service in certain sections of the city. The principal plan under consideration is to correct the present rush-hour congestion for through trains on Fulton and Pennsylvania Avenues. To remedy this a tube under Druid Hill Park is proposed. It would mean the first underground operation of electric cars in Baltimore.

Southern Public Utilities Company, Charlotte, N. C.—The Southern Public Utilities Company operating in Greenville, S. C., has been granted permission to build a double track line on Pendleton Street, Greenville, which will afford better facilities from the western and southern suburbs to the city. All work incident to street widening will be undertaken by the railway.

Oklahoma Railway, Oklahoma City, Okla.—The Oklahoma Railway is considering various routes for a new extension to Lincoln Park in Oklahoma City. Construction of the line will require about sixty days and will cost approximately $40,000. One plan is to extend the McNabb line to Lincoln Park, making the total length of the two lines 2½ miles.

Cincinnati, Ohio. — Estimates for Section 4 of the Rapid Transit Loop, Cincinnati (Ohio), were approved recently by the Rapid Transit Commission. City Engineer Frank Krug, estimated that it would cost $506,408 to build that part of the loop from Mohawk to the Brighton Bridge. After the estimates were approved Mr. Krug was directed to start advertising. April 1 for bids.

Johnstown (Pa.) Traction Company. —The Johnstown Traction Company will start work on improvements within the next month. An investment of $248,000 will represent the total trackage improvement which will include rebuilding the Franklin Street line and relaying track on the Horner Street line.

Reading Transit & Light Company, Reading, Pa.—The Norristown Town Council has adopted a resolution that if the Reading Transit & Light Company does not begin the work of repairing streets over which the trolleys operate in Norristown before April 15 court action will be taken. The railway has delayed this improvement because of lack of funds.

Power Houses, Shops and Buildings

Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md. — Work will be started on the new $850,000 station and terminal of the Washington, Baltimore & Annapolis Electric Railroad on April 1. This station will be located at Howard and Lombard Streets. It will be equipped with every modern convenience.

Public Service Railway, Trenton, N. J.—The Public Service Railway has informed the City Commission of Trenton, N. J., that it cannot afford at this time to build the proposed trolley terminal at State and Warren Streets, Trenton. The company some time ago purchased the old Trenton Bank, a marble structure, for the purpose of housing its cars in the center of the city and providing a waiting room for passengers. The Trenton Commission requested the railway to have a representative before it and explain matters.

Professional Notes

Dwight P. Robinson & Company, Inc., are the designers of the new shops for the Boston Elevated Railway, described and illustrated in the issue of this paper for March 19, page 555.

McKay & Sherman, 741 Monadnock Block, Chicago, has been formed by Charles W. McKay and P. C. Sherman for the practice of engineering valuation of industrial and public utility properties.

Trade Notes

The Bethlehem (Pa.) Steel Company announces the appointment, effective at once, of E. E. Goodwillie as sales agent in charge of its Cleveland office.

The Automatic Reclosing Circuit Breaker Company, Columbus, Ohio, announces the opening of an office at 510-512 Brown-Marx Building, Birmingham, Ala., in charge of B. M. Rogers.

The American Atmos Corporation, Pittsburgh, manufacturer of the Atmos and Dreager oxygen resuscitation and breathing apparatus, announces the appointment of George Oliver Smith as vice-president and chief engineer.

The Cincinnati Electrical Tool Company, Freeman Avenue, Cincinnati, Ohio, has been authorized to increase its capital stock from $75,000 to $225,000. The company, it is stated, does not contemplate any immediate extensions.

The Independent Pneumatic Tool Company, 600 West Jackson Boulevard, Chicago, announces the removal of its Pittsburgh office from 1208 Farmers' Bank Building to 718 Bessemer Building, Sixth Street and Duquesne Way.

The Simplex Wire & Cable Company, 201 Devonshire Street, Boston, announces that it has made arrangement with the Eastern Engineering Company, with main offices in Tampico, Mexico, to handle its products in that country.

The Simmen Automatic Railway Signal Company, manufacturer of speed control devices, cab signals, block signal systems and automatic recorders of train movements, has moved its offices from Buffalo, N. Y., to Eden, N. Y.

The Celluloid Zapon Company, 200 Fifth Avenue, New York City, manufacturer of lacquers, insulating varnishes, lamp frostings, etc., announces the opening of its Philadelphia office at 520 Walnut Street, in charge of B. O. Clausen.

The Wagner Electric Manufacturing Company, St. Louis, announces the removal of its Boston office and service station to 342 Newbury Street, where it will occupy the entire building. Brooks Faxon will continue in chage as district manager.

The Keystone Hair Insulator Company, 1243 Spring Garden Avenue, Pittsburgh, manufacturer of electrical equipment, is reported to be receiving bids for the erection of a three-sto building, 70 ft. x 100 ft., in the vicini of its present plant.

The Hazard Manufacturing Compar Wilkes-Barre, Pa., manufacturer wire rope and electrical wires a cables, has opened a new sales offi and warehouse at 1701-1703 First Av nue, Birmingham, Ala., in charge R. J. Bravard, district manager.

The Brandywine Fibre Produc Company, Wilmington, Del., announc that it is now in a better position th ever before to take care of hard vulca ized fiber tubing in standard m lengths or parts machined to ord The company has recently doubled capacity in floor space and trebled equipment.

The Acme Wire Company, N Haven, Conn., announces the openi of its Chicago office at Room 1105, Mo adnock Block, 53 West Jackson Bou vard, in charge of H. B. Bassett. T company also maintains branch offic in the Guardian Building, Cleveland, charge of J. T. Crippen, and in N York City at 52 Vanderbilt Avenue, charge of H. S. Glasby.

The American Insulator Corporati New Freedom, Pa., announces the a pointment of the Albert J. Cox Co pany, 564-570 West Monroe Stre Chicago, as its sales representative the States of Illinois, Indiana, M souri, Iowa, Minnesota and Wiscons The Albert J. Cox Company will hand the "Aico" line of products, consisti of cold-molded insulating parts electrical units.

New Advertising Literature

Diesel Engines. — The Busch-Sulz Brothers Diesel Engine Company, Louis, is distributing a bulletin descri ing its Diesel engines in large hyd electric, stand-by and auxiliary plan

Boiler Plant Economy. — The H- B-W Cochrane Corporation, Philad phia, has issued a second revised editi of "Finding and Stopping Waste Modern Boiler Rooms." The book cloth bound and contains 414 pages.

Circuit Breaker. — The Automa Reclosing Circuit Breaker Compar Columbus, Ohio, is distributing its n bulletin No. 312, which covers t theory of operation and application the automatic reclosing circuit break

Safety, Sanitation and Welfare.—T Bureau of Safety, Sanitation and W fare of the United States Steel Corp ration, 71 Broadway, New York Ci has issued bulletin No. 8, containi ninety-five pages of illustrations what has been done to improve livi and working conditions of employees.

Line Equipment.—The Electric Pow Equipment Corporation, Thirteen and Woods Street, Philadelphia, issued bulletins Nos. 103, 104, 200, 2 and 600, covering its indoor choke coi copper fittings, pole-top switches, o door bus supports and control switch respectively.

Why your Safety Cars should have The Peacock Staffless Brake

The Peacock Staffless

insures safety

The Peacock Staffless is geared in the ratio of 12 to 52. A force of 50 pounds exerted on a 20 in. hand wheel develops 1,333 pounds BRAKING power. By varying the size of the handwheel and the human force exerted EXACTLY THE CORRECT AMOUNT OF BRAKING POWER can be developed to meet any condition of crowds, traffic, grades, weight or size of car, etc., etc. Incidentally the Peacock Staffless develops THREE TIMES the power of an ordinary hand brake having the same size hand-wheel, using the same human power. Think it over !

NATIONAL BRAKE COMPANY
890 Ellicott Square
Buffalo, N. Y.

The Dozen Peacock Reasons

1. Saves half the space of the ordinary hand brake.
2. Weighs ***less.***
3. Gives three times the braking power for the same human power.
4. Operates without binding — no staff — no bevel gears.
5. Simple in construction.
6. All operating parts above floor.
7. Invariably sure and certain in operation.
8. Insures exactly the braking power needed for any size car.
9. Graduated stops and starts.
10. Housing protects working parts from dust, dirt, rain, snow.
11. Lower maintenance costs.
12. Greatest economy in the long run

Each advantage will be dealt with in future advertisements — or you may secure the whole story in full in Bulletin No. 10. A copy ?

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Detailed Examinations by Experts

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All of our plants have adequate facilities for fitting wheels to axles

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ELECTRICAL TESTING LABORATORIES
Electrical, Photometrical and Mechanical Testing
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Protect Yourself Against Breakdowns!

IRVINGTON

Black Varnished Cambric

prevents insulation failures because of its high resistance, high dielectric strength, non-hygroscopic qualities, heat resistance and neutrality to chemical action.

Irvington Varnished Cambric is woven from specially selected long fibre cotton.

The fabric is treated in our own bleachery by a special process which gives it a smooth uniform finish, increases its insulation value and mechanical strength.

Uniform coatings of any desired thickness are obtained by treatment in our own specially designed towers.

Irvington Insulation in silk, cotton or paper in punched form, washers, tubing or odd shapes, can be supplied to meet your requirements.

Our increased facilities enable us to make prompt shipments of orders.

Our prices will be of special interest to you.

Largest makers of Varnished Cambric in the world

IRVINGTON PRODUCTS

Oiled Silk, Varnished Paper, Black and Yellow Varnished Cambric, Flexible Varnished Tubing, Special Folded Paper for Coil Windings, Insulating Varnishes, Slot Insulation.

TRADE MARK
Reg. U. S. Pat. Off.

IRVINGTON VARNISH & INSULATOR Co.
Irvington, New Jersey.
Established 1905

Why "Noark" Fuse protection is dependable insurance

The best made fuse—"Noark"

THE reliability of a "Noark" Fuse is never a doubtful matter. Throughout the entire process of its manufacture every precaution is taken to insure reliability and in addition these precautions are backed up by many actual tests of every fuse before it leaves the factory.

The name, "Noark," on a fuse is too valuable to risk on anything but the best. So, when overload or short circuit occurs, you know a "Noark" Fuse will open the circuit promptly, quietly and safely.

"Noark" Renewable and Non-Renewable Cartridge Enclosed Fuses, in all standard capacities, are approved by Underwriters' Laboratories, Inc., under the Label Service.

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Madison Ave., at 41st Street, New York City
Branches in 66 Large Cities
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JOHNS-MANVILLE SERVICE
COVERS THE CONTINENT
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Heat Insulations, High Temperature Cements, Asbestos Roofings, Packings, Brake Linings, Fire Prevention Products

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ELECTRICAL MATERIALS

Engineering Service

These two words may or may not give you any mental picture. But we think a few words will suffice to tell you what they mean when Texaco Lubrication Engineering Service is meant. It means the service of a live, forward-looking body of trained specialists, who are not bound down to any traditions or complacent satisfaction with past performances. Their services will be bent toward securing and holding the business of a road by constantly improving results.

It means that because they have no cut and dried schedule to adhere to, they will cooperate with your employees to reduce repair costs by improving lubricating conditions, and you will find, that with their unequaled choice of Texaco Lubricants to draw from, that they will give you in each and every instance, the oil that is exactly suited to the purpose. They will study your mechanical conditions and prescribe the right amount, and they have the initiative and vision to change that amount when conditions change.

They are "on their toes" all the time, giving your road the benefit of their experience solving lubricating problems all over the country.

And back of them is a great big live organization.

Remember, also, that fundamentally, bearings, gears, cylinders, pistons, and other mechanical parts are quite the same in all branches of power production and utilization, and that the experience we have gathered in reducing lubricating and maintenance costs for users and producers of power in almost every line of endeavor in the industrial world, is brought to bear on your individual problem.

Try Texaco Lubricants and the service that goes with them and watch maintenance charges decrease.

Last Advertisement—"Lubrication and Maintenance Costs"
Next Advertisement—"A List of Texaco Lubricants for the Electric Street Railway Field"

There is a Texaco Lubricant for Every Purpose

THE TEXAS COMPANY
DEPT. R.J. 17 BATTERY PLACE. NEW YORK CITY
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Russy

In building dikes along the Yellow River the Chinese have a unique method of pile-driving which is original but hardly efficient. The picture illustrates; a circular disk of iron or stone, about eighteen inches in diameter and from two to three inches thick, is attached to short lengths of *russy* (rope) with a laborer at each end.

Then, with a song to help keep in unison, the disk is flung up into the air and falls with a business-like thud. Very impressive if one had never seen piles driven *à la American.*

In showing the wisdom of using Morganite brushes Morganite prescribers have a unique method of driving home the truth which is *both* original and efficient—they first determine what kink in your operating conditions causes your brush trouble, then prescribe just the right type of brush to *fit* the kink.

Result, happiness for everybody!

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The Brakes surely kicked that time

It's not just plain wear or temporary mis-use as a brakeshoe that puts brakeshoe heads on the quick down and out.

You may not have some of those old-style trucks with the brakeshoes on the upper half of the wheel, but chattering and kicking brakes are no novelty on modern trucks either.

As long time specialists in trucks and brake rigging, we saw the need for real materials and real workmanship in every part where improved resistance to strain and wear would pay for its application in greater safety and more revenue miles by giving more life and decreasing shopping time.

Hence the development of the quadruple life Boyerized manganese brakeshoe head of these other Stag Brand manganese specialties.

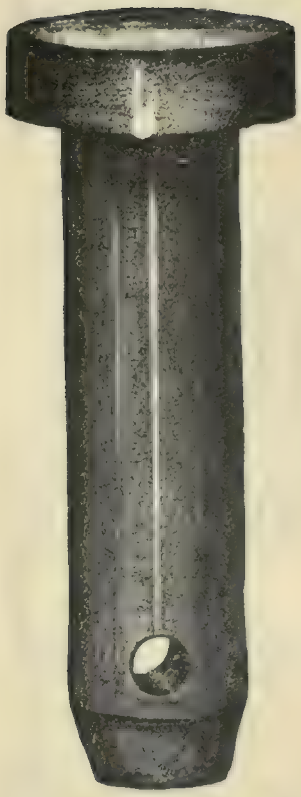
Brake Hangers	**Spring Post Bushings**
Brake Fulcrums	**Side Bearings**
Brake Levers	**Center Bearings**

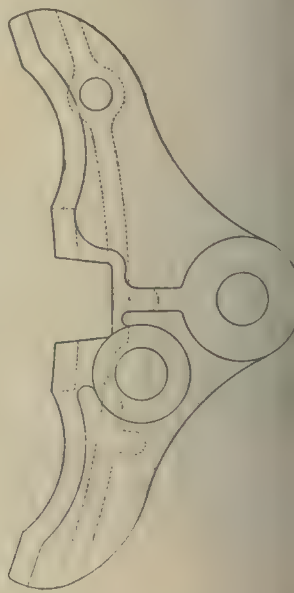
Spring Posts
Bolster and Transom Chafing Plates
Pedestal Gibs

They are as superior to the common run of heads as Boyerized Brake Pins and Bushings are to other pins and bushings. We solicit your inquiries for each and every one of them.

"So tough they cannot be drilled, and still pliable enough to bend without breaking."

Bemis Car Truck Company
Electric Railway Supplies
Springfield, Mass.

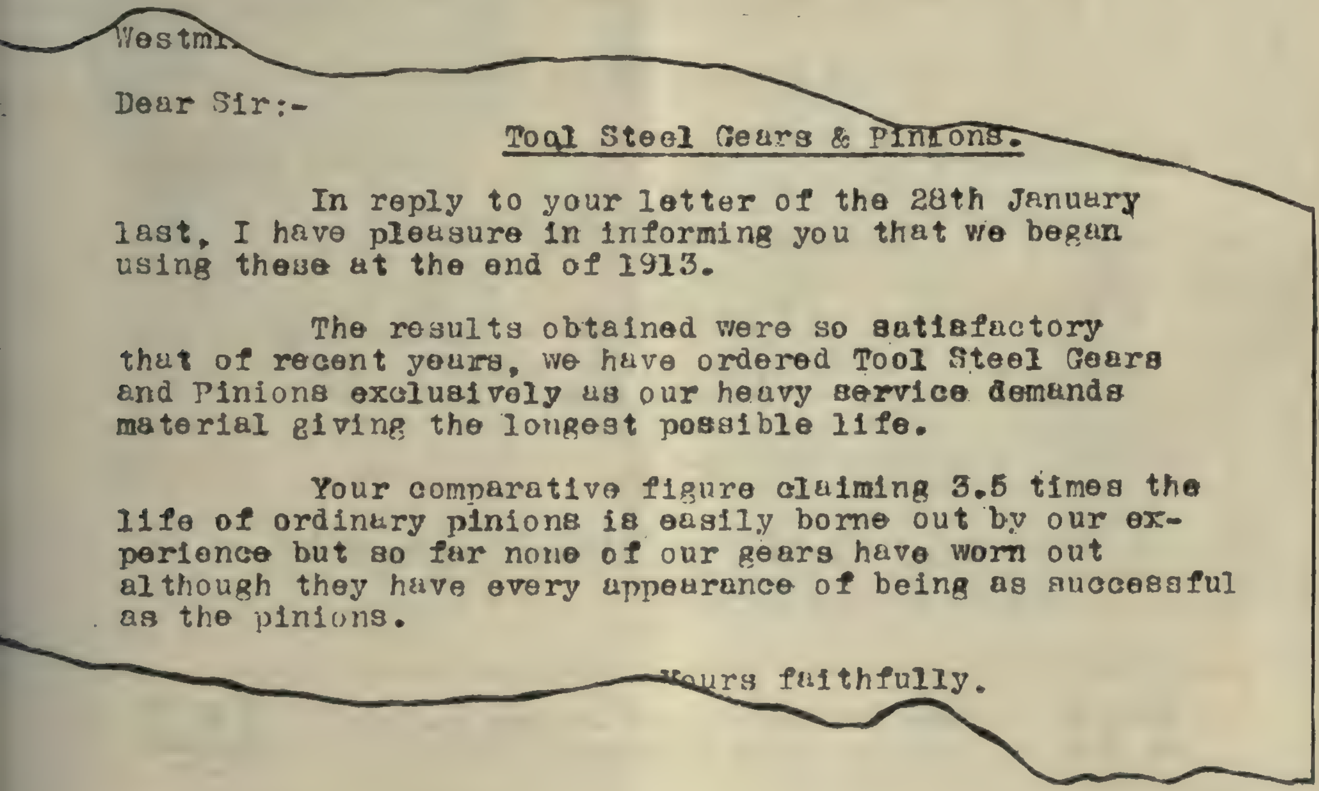




NEW ZEALAND *Says:*

T. S. Q. means this

(Copy of letter from the General Manager of the largest Electric Railway line in New Zealand.)



Westm

Dear Sir:-

Tool Steel Gears & Pinions.

In reply to your letter of the 28th January last, I have pleasure in informing you that we began using these at the end of 1913.

The results obtained were so satisfactory that of recent years, we have ordered Tool Steel Gears and Pinions exclusively as our heavy service demands material giving the longest possible life.

Your comparative figure claiming 3.5 times the life of ordinary pinions is easily borne out by our experience but so far none of our gears have worn out although they have every appearance of being as successful as the pinions.

Yours faithfully.

"Tool Steel" Quality T. S. Q. "Tool Steel" Quality

Tool Steel Gear and Pinion Co.
Cincinnati, Ohio

"STANDARD"

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

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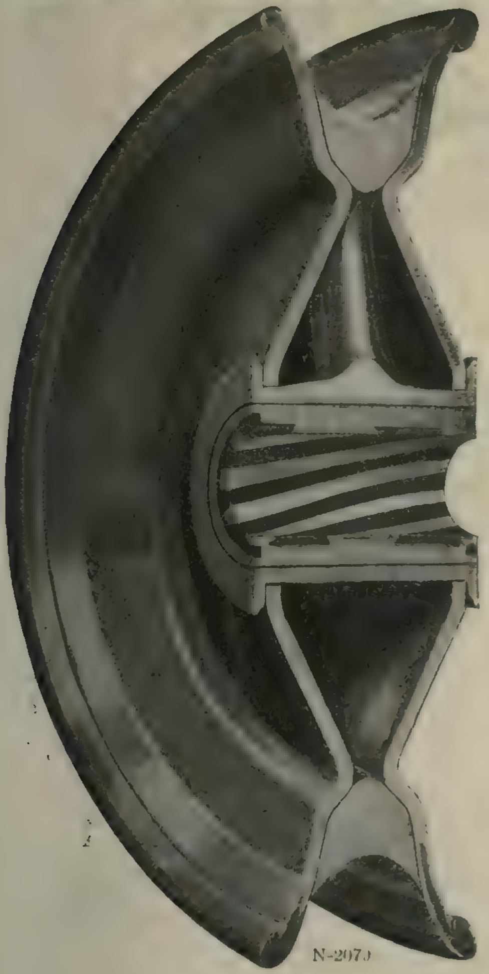

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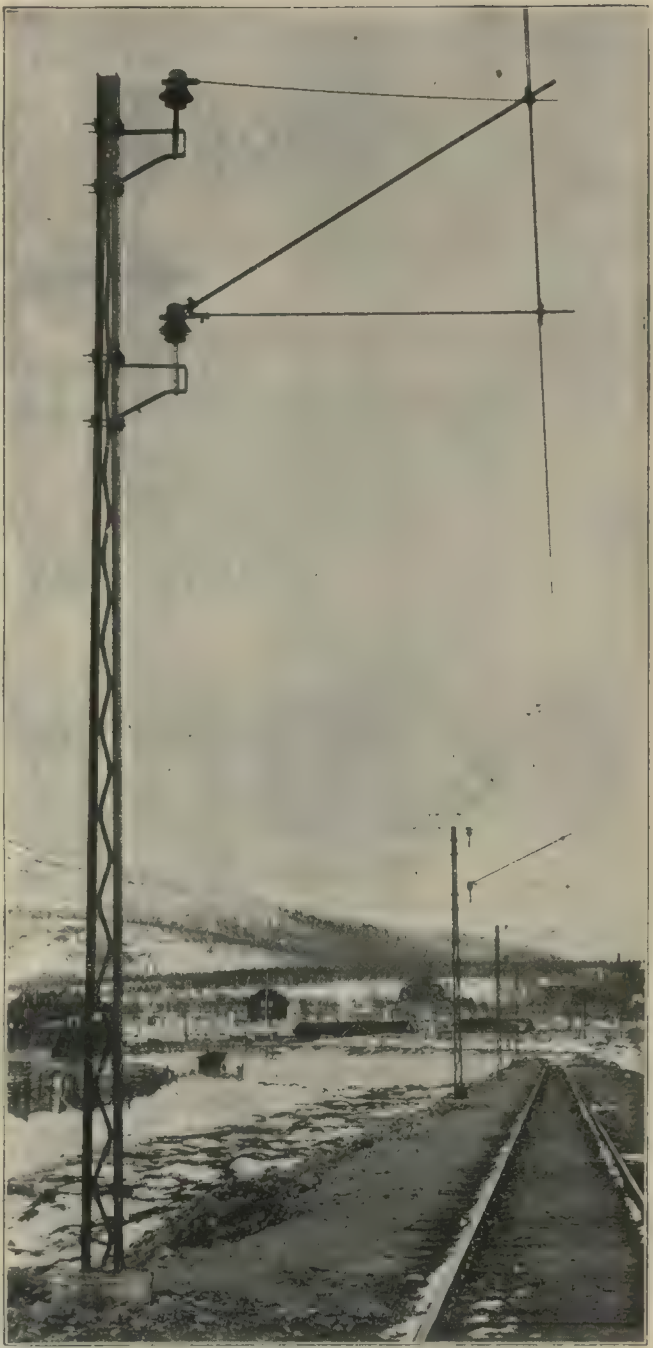

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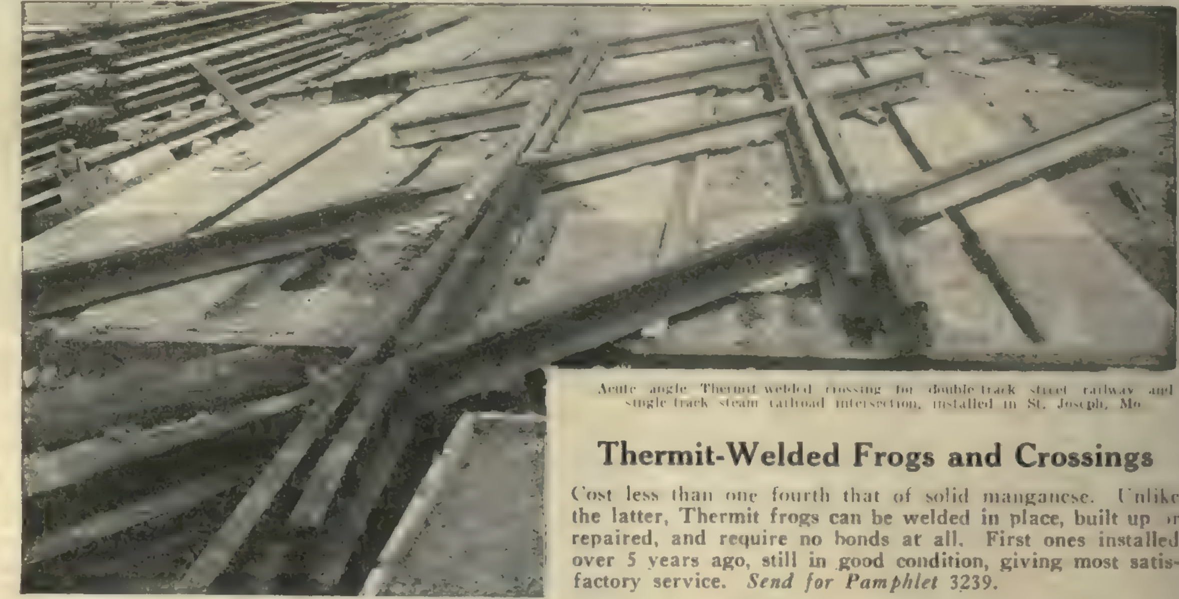

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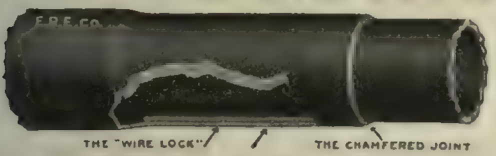

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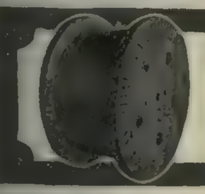

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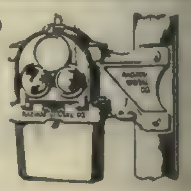

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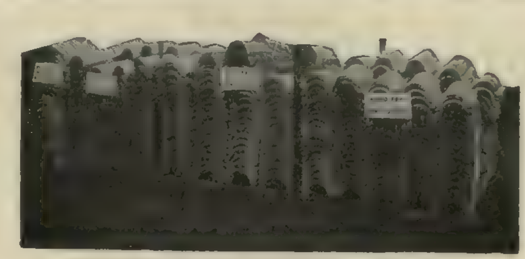

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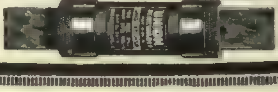

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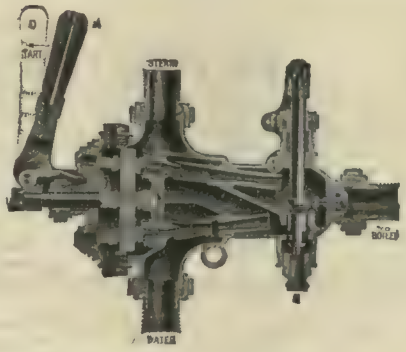

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Double Tube Injectors	Catalog	1-A
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Chimney Ventilators	"	4-B
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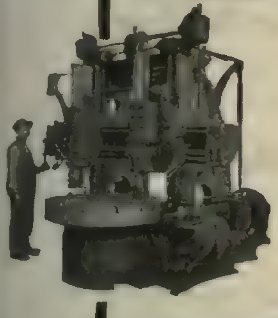

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PEREY TURNSTILES or PASSIMETERS
Faster than the ticket seller
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Cleveland Fare Boxes protect all the fares. They accommodate any rate of cash fare and any kind of ticket.

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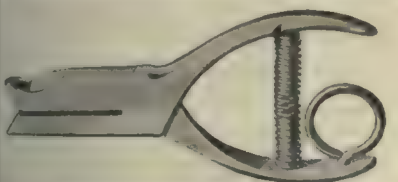

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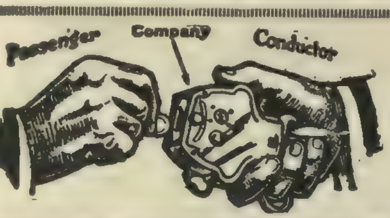

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Electric car heaters—thermostatic control—pneumatic car door operators—buzzers, single-stroke bells, starting signal lights—special resistances.

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612

Bound Brook Trolley Wheel Bushings Give Longer and Better Service

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EMPLOYMENT

POSITIONS WANTED

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BARN foreman wanted. Location, New England. Must be familiar with inspection and maintenance of equipment as conducted on up-to-date property. Knowledge of motor practice, electrical equipment, and ability to handle union labor essential. No overhauling or painting. Seventy city cars all modern equipment. This is an unusual opportunity for capable man to make showing. State age, experience, present salary and references. P-865, Elec. Ry. Journal.

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ROAD master now employed, wants change. 20 years on trolley roads. Can handle any track proposition. Reference very best. Seven years in one of largest cities in this country. PW-862, Elec. Ry. Journal.

SUPERINTENDENT—Street railway construction, rehabilitation, special work installation, welding, grinding, paving; long experience; speedy; economic; reliable. Member Society Civil Engineers. PW-861, Elec. Ry. Journal.

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Penna. Steel Co. Section 228, 107 lb. to the yard. Attractive price upon application. Subject to R. W. Hunt & Company's Inspection. Prompt shipment.

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1—150 kw., for Electric Railway, complete with transformers to change 2300—60 cycle, 3 ph., A.C. to 575 D.C.

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FOR SALE

Eight G. E.

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first-class condition. Car type 1200-600 V. 15 Amps.

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Charleston, W. Va.

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American Transfer Punch

Foot Power with "V" Shaped Die
Used only five months—Good as new.

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Youngstown, Ohio

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on the

Searchlight

and your

Advertisements in it

0197

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we have been

Buying and Selling

Second-Hand Cars

Trucks and Motors

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ELECTRIC EQUIPMENT CO.
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MAKE US A PRICE

On 70 Stationary Screens for Intake

Size 6 ft. 8 in. x 6 ft. 9 in. High
Frame 6 in. channel
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also
4 screens
Sizes 6 ft. 8 in. x 3 ft. 6 in. High

These screens are well made and are ready for immediate delivery from our West End Station, Cincinnati, Ohio.

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Cincinnati

CONTROLLERS

15—K-10 second hand controllers equipped with ESSCo automotoneers with operating handle, no reverse handle.

4—K-14 second hand controllers, two equipped with ESSCo automotoneers. All have operating handles, no reverse handle.

Above controllers have been thoroughly overhauled with new parts necessary and are in excellent condition. Write Purchasing Agent, East St. Louis and Suburban Railway Co., East St. Louis, Ill., for information and prices.

NEW REBUILT **ELECTRIC MOTORS** REWINDING REPAIRING

NEW A.C. MOTORS ¼ to 15 H.P.—LARGE STOCK USED MOTORS
EXCELLENT REPAIR SERVICE ON ANY SIZE OR TYPE

CLEVELAND ARMATURE WORKS, INC.

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WE'VE GOT 'EM!

No. 1 Relaying Rails and Angle Bars for Immediate Shipment

**30 lb., 40 lb., 50 lb., 56 lb., 60 lb.,
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WRITE OR WIRE FOR QUOTATIONS STATING TONNAGE and DESTINATION

***NEW*—80-LB. RAIL and ACCESSORIES** A. R. A. "TYPE B" RAIL
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We buy electric and steam railways that are to be dismantled

Some One Wants to Buy

the equipment or machinery
that you are not now using.

This may be occupying valuable space, collecting dust, rust and hard knocks in your shops and yards.

Sell it *Before* depreciation *Scraps* it.

0178

Machinery in Stock for *Immediate Shipment*

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2—200 kw. G. E. 25 cy. 370 v. A.C., 600 v. D.C., 750 r.p.m.
1—150 kw. Westg. 3 ph. 60 cy. 370 v. A.C., 575 v. D.C., 720 r.p.m.
2—150 kw. G. E. 25 cy., 370 v. A.C.; 600 v. D.C., 750 r.p.m.

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FITTINGS AND TOOLS
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Air Aftercoolers
Ingersoll-Rand Co.

Air Receivers
Ingersoll-Rand Co.

Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

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Lackawanna Steel Co.

Automobiles and Buses
Brill Co., The J. G.

Axles
Bemis Car Truck Co.
St. Louis Car Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Standard Steel Works Co.
Westinghouse Elec. & Mfg. Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Babbitt Metal
More-Jones Brass & Metal Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

Batteries, Dry
Johns-Manville, Inc.

Batteries, Storage
Electric Storage Battery Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
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Westinghouse Elec. & Mfg. Co.

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Stucki Co., A.

Bearings, Oilless, Graphite, Bronze and Wood
Bound Brook Oil-less Bearing Co.

Bearings, Roller and Ball
Railway Roller Bearing Co.

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Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

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Niles-Bement-Pond Co.

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Babcock & Wilcox Co.

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Bond Testers
American Steel & Wire Co.

Bonding Apparatus
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Electric Ry. Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail
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Copper Clad Steel Co.
Electric Ry. Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville, Inc.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Boxes—Junction & Outlet
National Metal Molding Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
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Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
National Ry. Appliance Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

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Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Traction Brake Co.

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American Copper Products Corp.

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Corliss Carbon Co.
General Electric Co.
Jeandron, W. J.
Morganite Brush Co., Inc.
United States Graphite Co.
Westinghouse Elec. & Mfg. Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

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American Copper Products Corp.

Bushings
National Metal Molding Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., J. G., The

Bushings, Graphite and Wooden
Bound Brook Oilless Bearing Co.

Cables (See Wires and Cables)

Cambric Tapes, Yellow and Black
Irvington Varnish & Insulator Co.

Cambric, Yellow and Black Varnished
Irvington Varnish & Insulator Co.

Carbon Brushes (See Brushes, Carbon)

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

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Brill Co., The J. G.
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Wason Mfg. Co.

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Electric Equipment Co.

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Eureka Co.

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Westinghouse Elec. & Mfg. Co.

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Ohio Brass Co.

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National Metal Molding Co.

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General Electric Co.

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Comstock Mfg. Co.
Electric Service Supplies Co.

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Cleveland Armature Works
Columbia M. W. & M. I. Co.
Comstock Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

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Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

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Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.

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Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

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General Electric Co.

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General Electric Co.
Westinghouse Elec. & Mfg. Co.

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Ingersoll-Rand Co.
Westinghouse Trac. Brake Co.

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Russell Mfg. Co.
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Ohio Brass Co.
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International Steel Tie Co.

**Crossing Signals (See Signals, Cro
ing)**

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**Crossings, Track (See Track, Spec
Work)**

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Wish Service, P. Edward

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Williams & Co., J. H.

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General Electric Co.

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National Pneumatic Co., Inc

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Electric Service Supplies Co.
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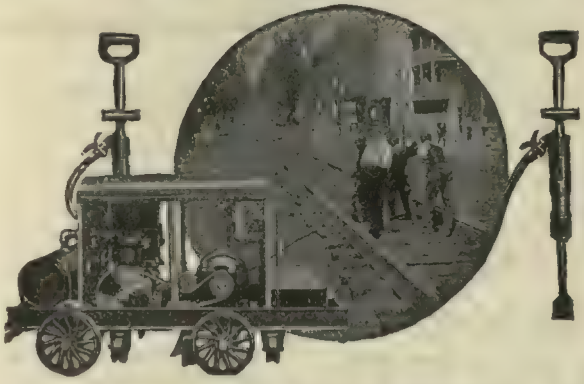

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International Register Co., Th
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Zelnicker, Walter A., Supply Inc.

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International Register Co., Th
Rooke Automatic Register Co

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Lackawanna Steel Co.

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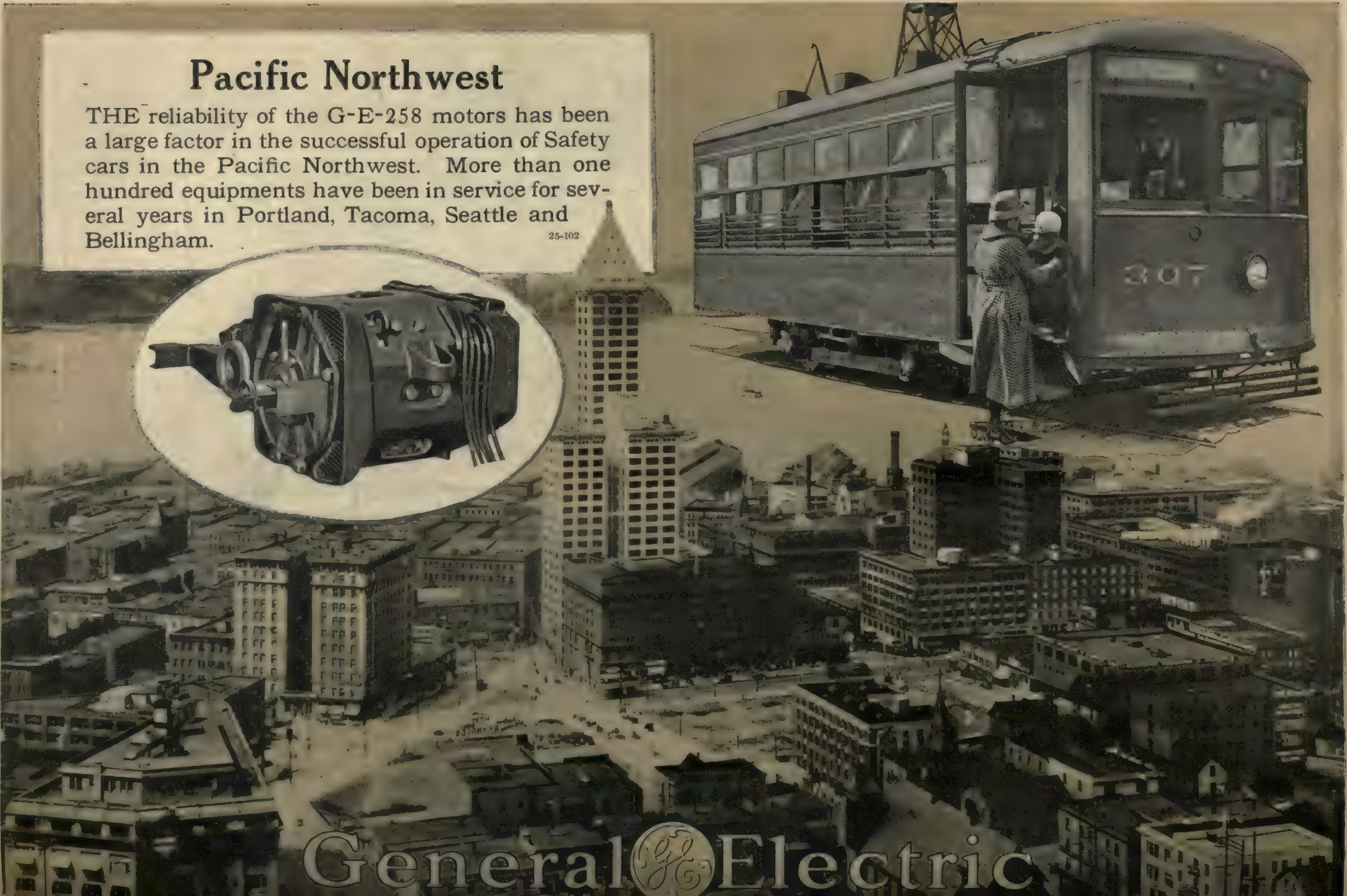

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Vol. 57, *No.* 14 New York, April 2, 1921 *Pages* 625-666

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing-Editor

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1. Save time and safeguard the employees in train make-up at terminals and junction points.
2. Insure the safety of the traveling public.
3. Afford perfect rigidity between connections, welding two cars or ten into a single, solid, easy-running unit.

When it is a question of getting the utmost in coupler strength, safety, economy and convenience, the greatest Electric Railway systems in the world, such as the "Interborough" and the "Municipal" of New York, know the advisability of specifying "Westinghouse Tight-Lock."

Made in heavy and light designs for all forms of multiple-unit operation.

Westinghouse Traction Brake Company

General Office and Works, Wilmerding, Pa.

"Fourteen Miles East of Pittsburgh"

New York	Washington	Chicago
San Francisco	Pittsburgh	St. Louis

And now Los Angeles. One of the 45 cars recently placed in operation.

Los Angeles Public Asks For More Genuine Safety Cars

Like Oliver Twist, the Los Angeles Public is asking for more.

The First order of the Los Angeles Railway was for the forty-five Safety Cars for use on two lines.

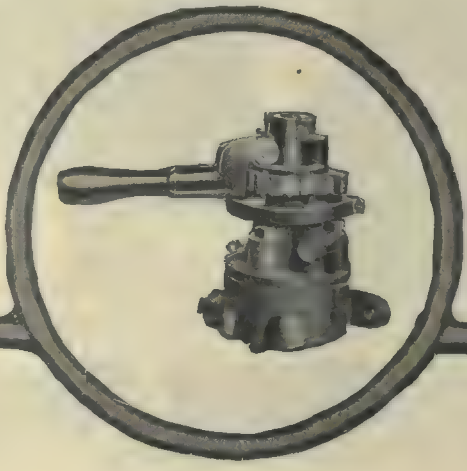
They were so successful, of course, that the company has received a recommendation from the Los Angeles Board of Public Utilities to install fifty more of the same kind.

This surely proves the advantage of handling the lower cost-more business problem right. No worry that either the car operators or the public regulatory bodies will object to this or that feature. They know that

It Is a Genuine Safety Car Only When

it is equipped with automatic laborless apparatus, so interlocked that, regardless of the illness or distraction of the operator, the power will be cut off instantaneously, the air brakes and sander apply immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed and the step folded before the car can start, and when the airbrake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

Safety Car Devices Company
Boatmen's Bank Bldg., St. Louis
hicago San Francisco New York Washington Pittsburgh



UNION Style "L" Color Light

SIGNALS
Controlled by Continuous
A.C. TRACK CIRCUITS
Make
MAXIMUM OPERATING SPEED
Possible with
ABSOLUTE SAFETY
To the important freight and passenger traffic now moving over the entire 660 miles the St. Paul's electrified divisions through the Rockies and Cascade Range.

The Chicago Milwaukee and St. Paul Railway

Automatic Color Light Signals on
Electrified Divisions of the Chicago, Milwaukee & St. Paul Rwy.

"Union" Standard Uniform Equipment Throughout

Trade Mark

Union Switch & Signal Co.

SWISSVALE, PA.

National Trolley Guard
(Patented)
An inverted trough of open wire mesh. When the wheel leaves the wire it runs on the live guard and carries car and cargo to safety.

One Wreck Costs More Than National Trolley Guard for Every Crossing on the Line

Just one accident cost this Western property more than complete protection against such an accident on the entire road.

A green conductor had charge of the car. The trolley wheel jumped at a grade crossing. The retriever worked. A train was coming.

The conductor, in his excitement, couldn't release the rope. Fortunately the passengers were warned in time—no lives were lost.

But the car was completely demolished.

Buy National Guard and get it—before you pay for it anyway.

Send for "Guarding the Grade Crossings."

The Ohio Brass Company
MANSFIELD
OHIO

New York
San Francisco
Philadelphia
Los Angeles
Pittsburgh
Chicago
Paris, France

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1921

Manufactures:
Trolley Material, Rail Bonds, Car Equipment, High-Tension Porcelain Insulators, Third Rail Insulators.

Lincoln Process Welded Joints

Mr. Engineer—if you are not using Lincoln Process Welded Rail Joints you are not securing permanent track construction at a minimum cost. Thousands of these joints are installed yearly by both small and large street railways who are more than pleased with results.

Make an investigation and learn in detail how the RWB Dynamotor not only welds rail joints but does bonding, building up work of all kinds, and shop welding. It pays for itself.

Rail Welding and Bonding Company

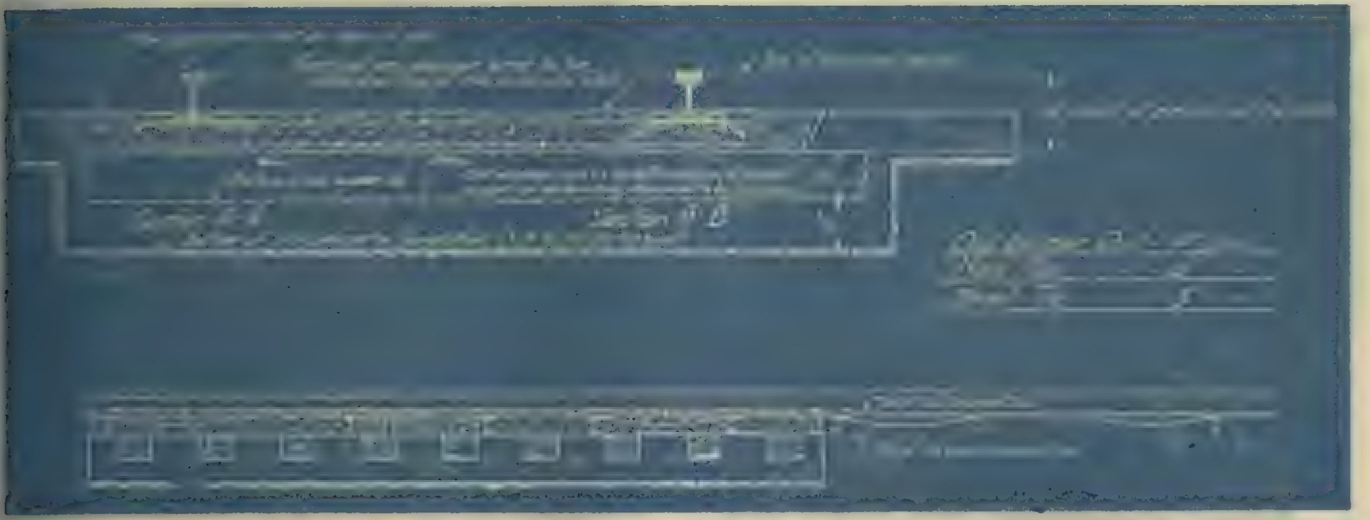
Formerly The Lincoln Bonding Co.

RWCOB

Cleveland, Ohio.

New York Office
30 Church Street
Chicago Office
343 So. Dearborn St.

London Representative:
Electrical Apparatus Export Corporation, 408-9 Bank Chambers—High Holborn



Save the Old Concrete!

WHERE old track with a concrete foundation must be rebuilt the old foundation is often in excellent condition.

By the use of STEEL TWIN TIES and a lower rail the old ballast may be saved intact.

The old foundation is left in place and new track and TWIN TIES are laid directly over it, as shown in the drawing above. The track is wedged to surface and line and good concrete, well tamped, finishes an economical job to the top of the paving base.

Occasionally the nine-inch clearance is not obtainable. In these special cases the old ties may be removed and the cross-channels of the STEEL TWIN TIES slip into the old tie spaces; or special flat TWIN TIES can be furnished.

We are always pleased to prepare special suggestions to cover your particular job of saving the old concrete.

The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

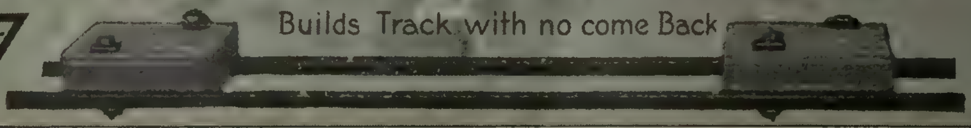
International Steel Twin Ties manufactured and sold in Canada, by Sarnia Bridge Co., Ltd., Sarnia, Ont.

Steel Twin Tie Track

The RESILIENT RAILWAY TIE

DMT Co

Builds Track with no come Back



Detailed information as to the cost, service and delivery, requested now, will have you prepared when the construction season opens.

What We Learn From Others

The car builder—the motor designer, and the truck manufacturer, all provide ***Resiliency*** in their product. As it is necessary and has proven successful in these cases, why not apply to the track. If it were not for the springs in the car seats, in the trucks and on the motors, how long would it be before they were shattered to pieces. Why not, then, give your concrete track foundation the same consideration, and apply ***Resiliency*** to it?

THE DAYTON MECHANICAL TIE CO., 704 COMMERCIAL BUILDING, DAYTON, OHIO

No. 22181 Resistance Panel

No. 21022 Single Stroke Bell

No. 19403 Buzzer

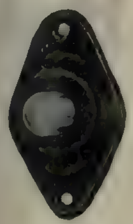
FARADAY

HIGH VOLTAGE CAR SIGNALS

The Faraday signal system provides a dependable and economical means of operating car push-button signal systems direct from the trolley circuit of 500 to 600 volts, thus doing away with the necessity of using a dry cell battery and consequent cost and annoyance of replacing run-down batteries.

When this system is once installed the cost of maintenance is practically negligible and, unlike the battery system, the buzzers do not have to be frequently adjusted to compensate for the running down of the cells.

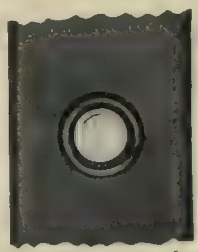
No. 19587 Vibrating Bell



Type A
Push Button

Type F
Push Button

Type B
Push Button



Type E
Push Button

Type D
Push Button

ELECTRIC SERVICE SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Streets

NEW YORK
50 Church St.

CHICAGO
Monadnock Building

Branch Offices: Boston, Scranton, Pittsburgh
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto

Miami, Fla., ready for its proposed street car line

No electric road (with exception of the Beach Line) is as yet running in Miami but the proposed road is going to cooperate in defraying the expense of making this street improvement because, along with the business firms and merchants, the railway company will be a beneficiary.

The merchants were after more business. The first step in accomplishing this was to make Miami more attractive. Down came the old wooden poles with their web of wires. Up went

"Elreco" Combination Poles

with span attachments for the future trolley wires.

In communities where electric railway systems are already operating the idea of the road cooperating with the Board of Trade and other civic welfare organizations in such improvements as this has proven itself remarkably beneficial to the traction companies. The good will it stimulates is, alone, well worth the expense.

We would be pleased to mail you photographs and data showing similar public improvements

Electric Railway Equipment Co.
Cincinnati, Ohio
30 Church Street, New York City

Modernize! *Pneumatize!*

National Pneumatic Speed-Up Devices Save in Any Class of Traffic

The National Pneumatic line of car speed-up devices is not merely a rapid-transit proposition, a surface-car train proposition, a big unit car proposition or a one-man car proposition.

It is a *universal* proposition because the things that National Pneumatic devices aid, namely, higher schedules, lesser platform expense and greater safety—are *also* universal propositions in any kind of electric railway service.

That's why you can and will find a place for one or more of the following specialties on your present cars.

National Pneumatic

Door and Step Control
Motorman's Light Signals
Door and Step Operating Mechanisms
Interlocking Safety Door Control
and
Multiple Unit Door Control

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd.
Toronto, Ont.

National Pneumatic Company, Inc.
50 Church St., New York
Edison Bldg., Chicago
Works: Rahway, N. J.

HABIRSHAW

"Proven by the test of time"

Insulated Wire & Cable

Mechanical Research Laboratory

HABIRSHAW maintains a Mechanical Research Laboratory for the purpose of developing insulation to meet the demands of the various new service requirements continually arising.

The rapid extension of the application of electricity to modern industrial processes is consequently bringing up new problems which Habirshaw is particularly well equipped to handle through its three research laboratories.

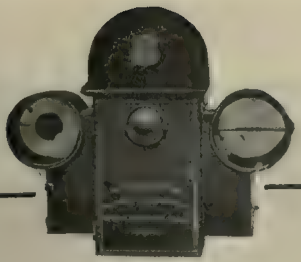
Habirshaw Wire Manufactured by
Habirshaw Electric Cable Co.
Incorporated
Yonkers, New York

Habirshaw Wire Distributed by
Western Electric Company
Incorporated
Offices in All Principal Cities

Paper Insulated Cable
Round Conductor Cables
Sector Cables

Varnished Cambric Insulated Cables
Armored Cables

Rubber Insulated Cables
Code (Black Core)
Intermediate (Red Core)
30% Hevea R. S. A. Standard



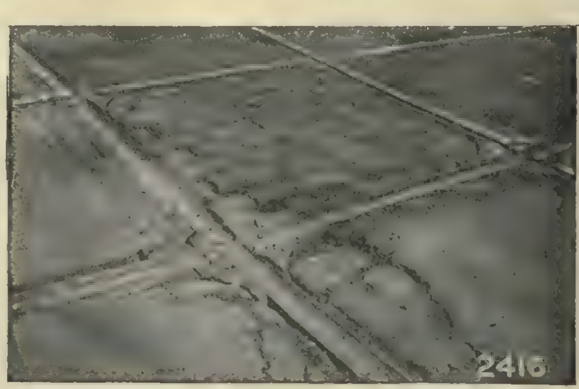
An unreliable signal is worse than no signal at all. U. S. Electric Signals are reliable.

Send for Bulletin

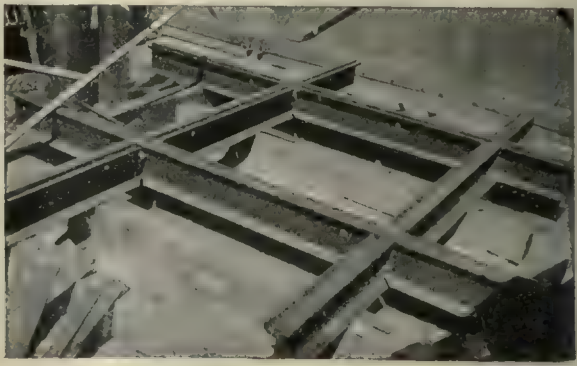
United States Electric Signal Company
West Newton, Massachusetts

Representatives:
Western: Frank F. Bodler, Monadnock Bldg., San Francisco. Foreign: Forest City Electric Service Supply Company, Salford, Eng.

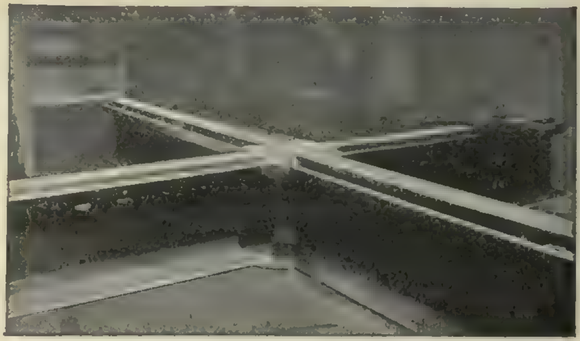
Backed by a Generation of Signal Specification



Worn out manganese insert crossing which was replaced by a Thermit-welded crossing



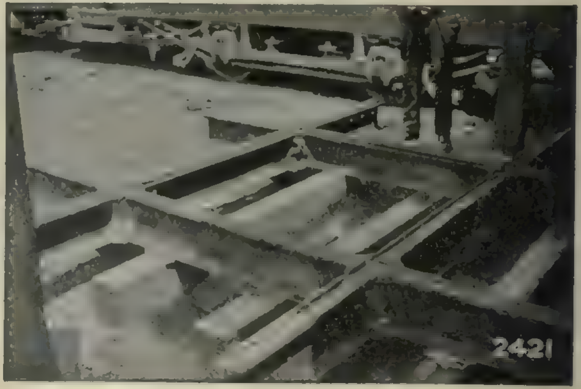
Rails cut out and lined up in position



One of the four wax patterns

Preheating in progress

Crucible set over mold, ready to start Thermit reaction



Welded crossing, ready to be installed in street

Replacing a single track crossing by a Thermit-welded crossing, Eastern Massachusetts Street Railway, Fall River, Mass.

THERMIT-WELDED Frogs and Crossings

The earliest Thermit-welded crossings, installed over five years ago, are still in service, giving the most satisfactory condition. Cost only small fraction of cost of solid manganese. Let us send you a Thermit outfit and instruct your men in welding, free of charge.

METAL & THERMIT CORPORATION

Boston
Pittsburgh
Chicago

120 Broadway

SERVICE
STRENGTH
THERMIT WELDING
ECONOMY

New York

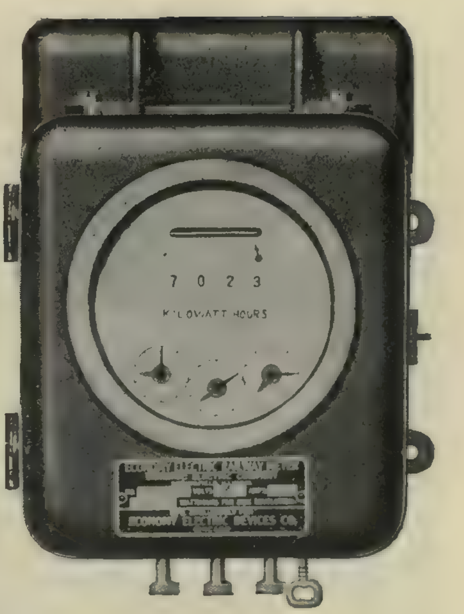
Toronto
San Francisco

Union Street Ry.

New Bedford, Mass.

orders

ECONOMY METERS



To Save Power at the Car—
—To Save Labor at the Car House

After a thorough test, the Union Street Railway of New Bedford, Mass., has ordered Inspection Dial Economy Meters for all of its active cars.

This is another one of the long list of notable electric railways to adopt the Economy Meter and order *complete equipment.* Economy Meters are now standard on more than 60 roads.

Economy Meters are rugged, time-tried devices

The Economy Meter will get the maximum saving with no hazard to passengers or equipment. It shows how much energy is consumed per man or per car. The records actually tell a motorman whether he has saved power—and how much.

There is no mystery about Power Saving with Economy Meters

The ECONOMY "Power-Saving" and "Car Inspection" Meter accurately and automatically shows when a car is due for inspection. It shows at a glance how much more work a car can do before inspection is needed. All this is had without any clerical labor.

The records from Economy Meters are of high value for managerial and engineering purposes.

Economy Power-Saving Meters tell you— without trouble

1. WHO are your careful, economical motormen.
2. WHICH motormen need instruction in proper handling of car equipment.
3. HOW much power is being saved by motormen collectively and individually, by direct reading units of power.
4. HOW much power is being used on any section of your lines.
5. HOW much power is being used in trailer service.
6. HOW much power your freight and express service is using.
7. HOW much power is being used for switching and car movements in yards.
8. WHAT is the line loss on your D.C. distribution.
9. WHEN your schedule speeds are too high or too low.
10. WHAT is the most economical equipment for any service.
11. WHAT are the proper gear ratios for given service conditions.
12. WHEN each car should be inspected.

Meter the energy—that's what you want to save

Economy Electric Devices Company

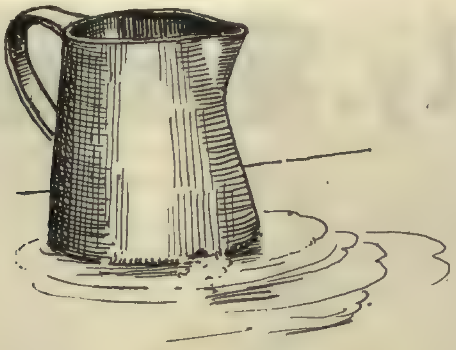
L. E. GOULD, Pres., Old Colony Bldg., Chicago

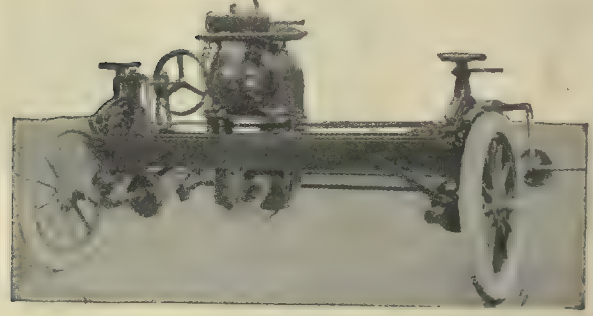
Cable Address: Sangamo, Chicago

National Railway Appliance Co., New York
L. A. Nott, San Francisco

Burton R. Stare Co., Seattle
J. G. Monahan, Los Angeles

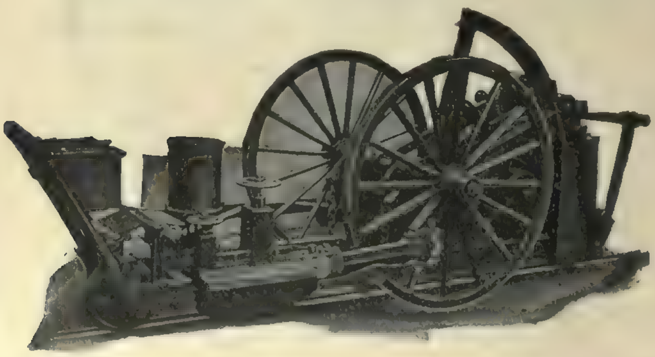
Ludwig Hommel & Co., Pittsburgh
Grayson Railway Supply Co., St. Louis





The Universal Rotary Track Grinder has many features which facilitate and increase the accuracy of its work.

For getting into the grooves of girder rails, frogs, switches, etc., and for removing surplus metal used to fill up low or cupped joints the Atlas or the Universal Rail Grinder will produce excellent results.



The Reciprocating Grinder is especially adapted to grinding out corrugations, slightly cupped and new joints where a planetary grinding surface facilitates the work. Moreover, it produces results in grinding with the removal of minimum of metal from the rail head.

A Run Down Track is Like a Leaky Oil Ca

Poor track like a leaky oil can wastes ma
times the cost of repairing it.

Just as a leaky oil can can be easily repai
by a few drops of solder, run down tra
can be put back into a good smooth ridi
condition for a small amount by prop
track grinding

But with this difference—

The penalty of failure to repair the oil c
before it has gone beyond repair is a sm
matter. Replacement cost is a trifle.

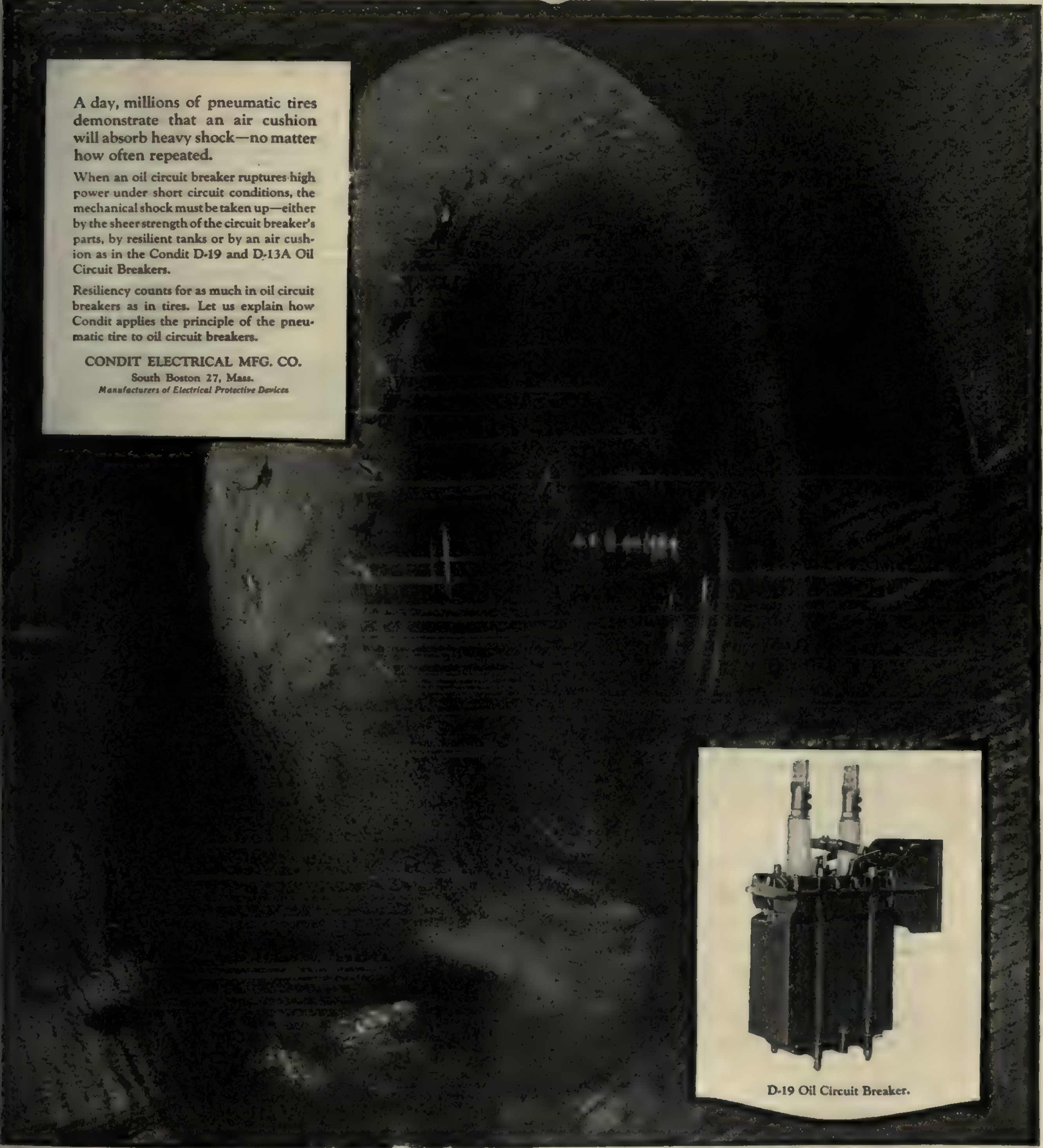
On the other hand, if track repairs a
neglected so long that replacement becon
necessary, the result is almost a disaster. T
cost of good track is lowest where repa
are made oftenest.

Rail grinding before joints are too bad
cupped, rails too badly corrugated and sp
cial trackwork too badly battered is not on
inexpensive, but results in tremendo
savings.

Even when rails are so far gone that replac
ment seems unavoidable, rail grinding w
put off the evil day for years.

RAILWAY TRACK-WORK CO.
3132-48 East Thompson St., Philadelphia, Pa.

Billions *of* Times



A day, millions of pneumatic tires demonstrate that an air cushion will absorb heavy shock—no matter how often repeated.

When an oil circuit breaker ruptures high power under short circuit conditions, the mechanical shock must be taken up—either by the sheer strength of the circuit breaker's parts, by resilient tanks or by an air cushion as in the Condit D-19 and D-13A Oil Circuit Breakers.

Resiliency counts for as much in oil circuit breakers as in tires. Let us explain how Condit applies the principle of the pneumatic tire to oil circuit breakers.

CONDIT ELECTRICAL MFG. CO.
South Boston 27, Mass.
Manufacturers of Electrical Protective Devices

D-19 Oil Circuit Breaker.

Specifications: 3 and 4 Pole; Manual Remote Control or Electrically Operated; Pipe Frame or Cell Mounting; 500, 800, 1200 Amperes; 15,000 Volts.

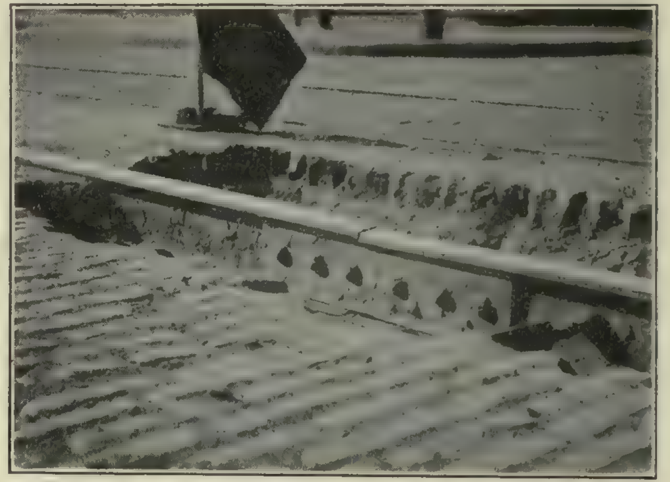
CONDIT

122-12

PROHIBITION has broken up a lot of low-down bad JOINTS

There is one "joint" in your town now under INVESTIGATION. The indications are that there are hundreds of others like it. It's a MENACE, DESTRUCTIVE, WASTEFUL, INJURIOUS, INTOLERABLE. Do you recognize it? What's going to be done about it?

ONE of TWO things:



Last Word in Reclamation of old and installation of new track.

This

"PATCH IT UP" Temporarily now, and AGAIN and AGAIN. Costing *EACH TIME* as much or more—by the "OLD WAY"—as by the Indianapolis Method.

Or, This

You are going to call the Indian-APOLIS, clean it up and RESTORE as GOOD AS NEW, just as other managers in 46 States and Countries are doing—By the "INDIANAPOLIS METHODS."

In the FIRST Instance, you have, One Time, One Cost...and PERMANENCY.

In the SECOND, you have Annual or MANY Times, Costs...and A FUGITIVE. Of course you know, WE know, EVERYBODY knows that *FINAL RESULTS* reflect the MERIT of methods.

The MERIT of the "INDIANAPOLIS METHOD"...After 10 Years' TEST... Still the BEST Maintenance ELIMINATOR.

The COST of the "INDIANAPOLIS METHOD"...NOTHING. It SAVES more than it Costs... ALWAYS.

ATTEST:

More Roads using the "Indianapolis Method" Than ALL OTHER methods COMBINED.

More Roads using "Indianapolis Welded Joints" Than are using all types COMBINED.

More "Indianapolis Fluxated Welding Steel Electrodes" used for TRACK purposes than all other brands of Welding wire COMBINED.

If you are a USER, the more you use the more you SAVE.
If you are not a USER, you are a LOSER. JOIN the SAVERS.

Don't NEGLECT to send for our Booklet on Track Maintenance

Indianapolis Switch & Frog Co., Springfield, Ohio

***New England Representative* J. J. Costello, 201 Devonshire St., Boston, Mass.**

Getting 99% Fare Collections During Rush Hours

Here is a reprint of a story on Fare Box efficiency which recently appeared in the Electric Railway Journal.

It's an interesting story—worth reading.

"There has been a serious question as to whether a fare box was efficient in collecting odd fares. It has been claimed that with the collection of odd fares it has been impossible with heavy loads for a conductor to observe whether all passengers drop in the exact fare. To determine the correctness of such a contention observations were made on a car operating in rush-hour traffic where a total of 340 passengers were carried in three trips. Two checkers were assigned to the car in order to guarantee correct data. It was found that 229 tickets and transfers were collected during this period, leaving a total of 111 passengers on board the car for whom there should be 6 cents each. Therefore the cash in the fare box should have been $6.66. Actually the amount of cash was $6.59. This difference of seven cents might have been a case of one passenger getting by and another depositing one cent short, or the entire amount might have been distributed among several passengers. On the basis of this test the efficiency of collection was 99 per cent."

Ninety-nine per cent fare collection *during rush hours.* That's one of the reasons why Johnson Fare Boxes increase gross revenue 3 to 10%. Isn't it worth investigating? Write to our Engineering Department today for complete data. No obligation.

JOHNSON FARE BOX COMPANY

Ravenswood, Chicago, Ill.

Correct lubrication means reduced labor costs

"Overall Specialists"

The service men who work with you on your lubricating problems are not "experts on theories." They put on overalls and get right down to brass tacks—pack your cars—*show* you how and why Tulc should be used. They get results—real money saving results—99 times out of a hundred. The hundredth time there is no charge for the service.

IN the final analysis the purchase price of a lubricant makes relatively little difference, because purchase price plays such a small part in determining the ultimate cost of lubrication. The real cost of any lubricant depends upon *service rendered.*

The truly low cost lubricant is the one that keeps rolling stock in operation without layups for repairs and overhauling—the one that reduces wear on axle bearings and journals—that eliminates hot boxes and cut axles—that reduces labor costs.

Tulc accomplishes all of these things. Lubrication costs on properties using Tulc are often reduced 40% or more. The saving in labor charges alone often pays the entire lubrication bill.

These are strong statements—but they are statements that will bear the test of *investigation.* That's all we want. We know that if you will *investigate* the time, money and labor saving characteristics of Tulc, you, too will become enthusiastic over its possibilities. Why not write today for complete data? No obligations.

The Universal Lubricating Co.
***Offices:* Schofield Bldg.**
Works: Sweeney Ave.
Cleveland, Ohio

TULC
A
LUBRICANT

scientifically and accurately compounded to reduce lubricating costs

The World's best Lubricants

GALENA QUALITY

The "Something Plus" That Does the Business

It is now frankly admitted by oil concerns who have "experimented" with the work of railway lubrication, that Galena Oils are the only lubricants capable of rendering satisfactory performance on the "guarantee contract" basis.

This unwilling admission was forced only after many unsuccessful attempts to match Galena records with inferior oils, that were unable to withstand the acid tests of service.

Galena Oils carry the "something plus" that makes imitation a sorry substitute. This "something plus" embodies the elements of quality and uniformity, combined with knowledge of exclusively Galena compounding processes that are the result of over a half century's experience in exhaustive test and research. It is this "something plus" that enables Galena Oils—whether bought on either a gallonage or contract basis—to deliver the maximum service that has marked their work on American railways—both steam and electric.

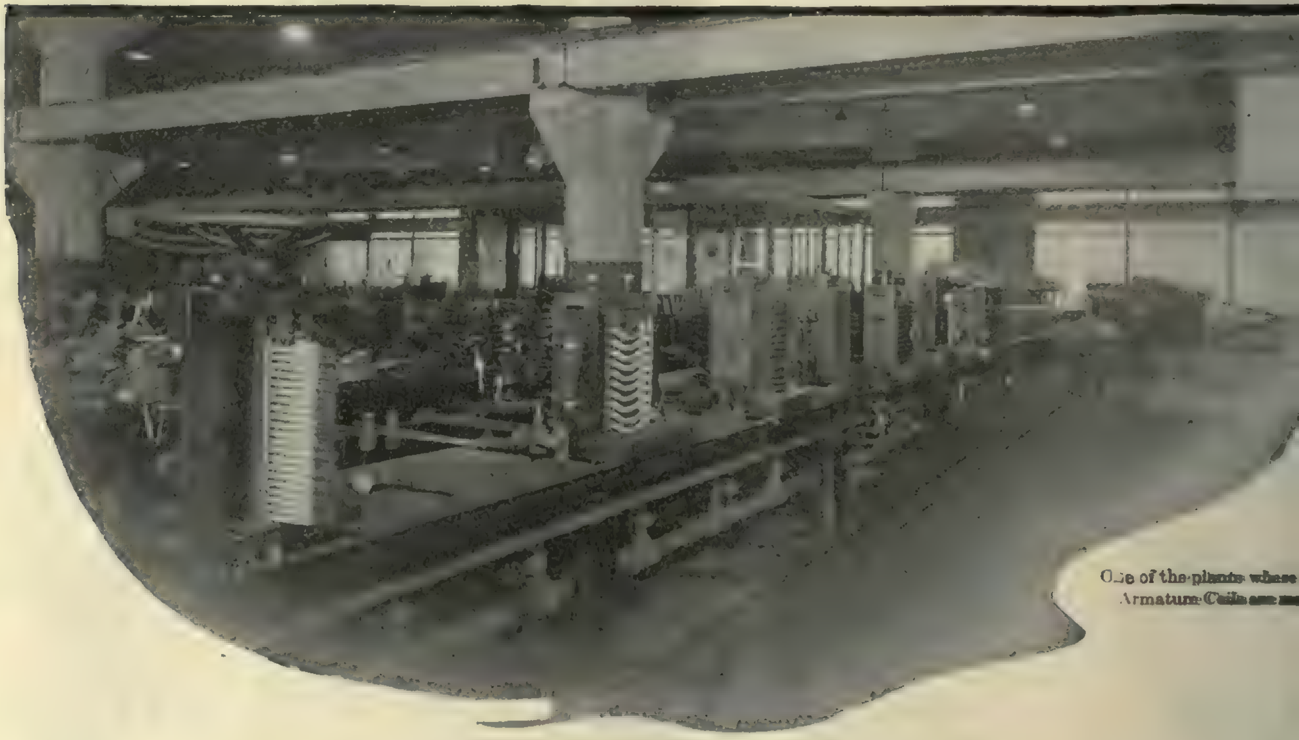
Railway Lubrication is not a "Side Line",
but a Specialized Business,
with this company.

TRIGRAM G S O C TRADE MARK

THE GALENA-SIGNAL OIL CO.
NEW YORK FRANKLIN, PA. CHICAGO
Offices in all principal American Cities
LONDON BUENOS AIRES PARIS

GALENA SERVICE

Foresightedness, in ordering while necessary material is obtainable, is only plain common sense in these days of high demand and low supply.



One of the plants where
Armature Coils are

Order Your G-E Armature Coils Now For Your Next Winter's Needs

Particularly in winter, is it advisable to have on hand plenty of repair parts for car equipment.

G-E Armature Coils are like spare tires in the garage. The burnt out armature can be made ready quickly for service again without waiting for new coils.

G-E Armature Coils for G-E Motors insure an absolute fit, saving time and injury to the coil in installing and later shrinkage and vibration in service. G-E Armature Coils are steam moulded, insuring permanent fit.

Remember that G-E repair parts for G-E equipment preserve "original equipment quality." Order now before winter storms can delay shipments.

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

4C-1

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing Editor
HARRY L. BROWN, Western Editor N. A. BOWERS, Pacific Coast Editor H. S. KNOWLTON, New England Editor C. W. SQUIER, Associate Editor C. W. STOCKS, Associate Editor
DONALD F. HINE, Editorial Representative A. D. KNOX, Editorial Representative GEORGE BUSHFIELD, Editorial Representative
G. J. MACMURRAY, News Editor

Volume 57 New York, Saturday, April 2, 1921 *Number* 14

How Far Does It Pay to Cut Expenses?

ON MANY an electric railway property it has been necessary to reduce expenses almost regardless of the results, and even to refrain from making expenditures which would have earned the interest rate several times over. Such procedure has "gone against the grain" with the thrifty manager who realizes that he or his successor must pay for this enforced parsimoniousness in the long run. Of what use is it to offer a man a 25 per cent investment if he has no money or credit? Many a railway has seemed to be in this position during the past few years.

Nevertheless, there is a limit to which expenses can be cut if a road is to be kept operating at all. If track and equipment are allowed to run down, sooner or later the earning capacity of the property is impaired. Either the railway physically will not be able to carry passengers or people will not want to ride on account of the shabbiness of the cars and the discomfort of travel. Therefore, before any more requests for maintenance or more service are turned down such questions as these demand answer: Have all possible economies in maintenance and in conducting transportation been located? Does the public which is holding down the fare fully understand the situation? Have all available means for securing new business been considered? Will the proposed curtailment seriously impair the service now and later? Have the best brains on the property and within reach elsewhere been exercised to the limit in trying to answer such questions as these?

The making of drastic cuts may be the only thing to do in some cases, but there is talent enough in the industry, financial, managerial and technical, to render the cuts less necessary if this talent is utilized 100 per cent. And this does not imply disparagement of the splendid results that have been and are now being achieved.

Route Vehicular Traffic to Avoid Main Intersections

IN MANY smaller cities the intersection of the main north-south and east-west thoroughfares is at the center of the business district. These two streets are usually occupied by the main street car lines and they also serve as the principal lanes of automobile and other vehicular traffic, thus focusing nearly all of the city's traffic at one point of intersection. This results in a bad congestion which should be corrected to the advantage of every one. It can be done simply and readily in almost every case with the co-operation of the police department if all through vehicular traffic is detoured one block to the right at the first corner before reaching this main intersection. This would clear the main intersection of practically all but the street car traffic which cannot be readily rerouted, would speed up materially the street car service through this intersection, would make the crossings much safer for pedestrians, and would very greatly help the rapid movement of automobiles through the downtown section.

The scheme would mean a two-block square in the center of the city, inside of which there would be only street car and pedestrian traffic, and around which automobile traffic would travel as it does around the circles in Washington. The total number of intersection movements occurring formerly at the one point would be divided between four points in a manner which would eliminate all holding of one-direction traffic while permitting the other-direction traffic to pass. This same scheme could also be used effectively in large cities to alleviate congestion at various outlying heavy-traffic intersections which are of much the same character as the one main intersection in a smaller city. The merchants located within the square would probably object, but the harmful effect on them would be questionable, while the advantage to every one else would be real and apparent.

Railway managers should make periodical speed observations on all sections of their lines where there is much congestion, and it is safe to say that if this is done startling results will often be obtained. Car-hours will pile up rapidly on an obstructed street, and in that case the thing to do is to appeal to the authorities for relief.

Adjusting Service as Traffic Changes

A CERTAIN railway company was operating three-fourths of its cars over the full length of a route and the remainder of the cars were turned back about three-fourths of the distance out. Traffic surveys showed that the interests of the riders on that line would be better served and thousands of car-miles saved annually if 50 per cent of the cars were turned back at a point midway between terminals. This recommendation was made to the management, but was not acted upon because there was no crossover at the street where it was proposed to "short line" part of the service.

Here is an instance of short-sighted economy which unfortunately is too common among railway men. A system is laid out originally with crossovers and other special work placed for the existing needs of service. In course of time the riding habit of patrons of the various routes changes and common sense indicates that the service should be graduated to meet their demands. Here comes the question of installing some new special work at a certain cost or of wasting that much or more annually in unnecessary car mileage.

It is one thing to have the defects of a system pointed out and another thing to act upon them. There is a field for traffic study on every railway property, and the deficiencies are usually more readily apparent to a trained expert who comes on to the system with a fresh viewpoint, free from operating responsibilities and with no local prejudices. Such an engineer will consider the traffic characteristics of a line and determine whether there is any excess or shortage of service on the system as a whole or on any of its parts. He may find that seats exceed passengers even in rush hours and the natural remedy would be curtailment of service. Some lines will be found with slower speed than others, and if this is not due to more short-haul riders or a greater number of traffic interferences, the schedule should be shortened. Excessive layover time may be found and if this is not called for by contract with the employees, the pruning knife of the time-table maker should be applied. Some long lines may be found over-lapping shorter ones, and again the traffic engineer might suggest elimination of duplicate service.

There are so many angles to be considered in the revision of schedules, however, that the railway executive is at times justified in "hastening slowly" even on the recommendations of a traffic expert. Local conditions have to be weighed seriously. Too sudden a shifting of service, even though warranted from the company standpoint, may not be good policy. The changes are more likely to "stay put" if they are made more slowly and thus not arouse public resentment. This does not mean that the company should mark time indefinitely while a real sacrifice of costly car-hours continues. Wasteful service will benefit no one, and the careful operator will know when and where to suit his facilities to the demands of the riders. This is the test of good judgment.

Is Public Ownership of Utilities Inevitable?

THAT it is, was the conclusion reached by an eminent engineer in a paper recently presented at a society meeting. Many good reasons were given to show that this is the logical outcome of present conditions. Thus the fact was pointed out that the rates and consequently the receipts of the companies are absolutely controlled by the authorities, while the expenses are also very largely determined by them or by circumstances over which the utility has no control. With service at cost, which is now coming into more general use, the argument perhaps is even stronger, and the author of the paper mentioned pertinently inquired what is the use of the stockholders when all business risk has disappeared. Why not simplify the relationship by having public management function direct? he asked.

Undoubtedly private ownership in such circumstances is somewhat of an anomaly. Its excuse is that public ownership of utilities under the political conditions which exist in most of our cities is still more of an anomaly. The fact is that the American municipality is not organized to conduct a commercial enterprise efficiently. The city fathers, as a rule, are not chosen for their business sense but for their ability to get votes. These two qualities rarely go together. But even if the business knowledge of the average city council and mayor was adequate to the task, if they agreed to discard politics in their management of the property, and if they had the courage to carry out such a program, there would still be the fatal weakness in municipal operation of frequent change in administration.

Service at cost, although it may have its drawbacks in the way of reduced incentive, has its continuous administration which can be kept keenly attentive to its work by the city transit administration. There are thus two interests, the railway and the city executive, watching each other, so that there is far less likelihood of the utility failing to do all it can than if the business was conducted by the city officials only, with no one with sufficient interest or authority to watch what they were doing. Finally, there is far less opportunity for politics to influence a private management, practically irremovable during good behavior, than a political management dependent for office on popular vote every two or more years.

Private ownership and operation may have its defects in the way of efficiency and economy, but that of the public would be much worse.

Cash from Casuals, Tickets from Regulars

A COMPILATION recently made by the statistical department of the American Electric Railway Association shows that in 1920 fifty-seven cities with a population of 25,000 or more were charging a 10-cent base cash fare, as against only twenty-five in 1919 and none in 1918 or 1917. The number of cities with other fares higher than 5 cents were as follows: Six cents in sixty-one, 7 cents in eighty-nine, 8 cents in twenty-three and 9 cents in four. The compilation also shows a considerable increase in the number of companies in cities above 25,000 population which are selling tickets at a lower rate than the single cash fares. These cases are especially numerous where the cash fare is 7 cents or more. The tendency toward a 10-cent fare is especially marked in the eastern part of the country while that toward a ticket rate applies to all sections The ticket rate generally has not been put in as a reduction over a previous cash rate but at the time that the cash rate has been increased, and its purpose evidently has been to make the increase more acceptable to the frequent rider.

One great advantage of the 10-cent fare, whether accompanied by the ticket plan or not, is that a single coin or token may be used to pay the fare. This is an advantage for both passenger and company. In fact it was to retain this advantage that so many companie held on to the 5-cent fare long after it became inadequate. The single coin is a time saver both to th conductor and the passenger, and as the 10-cent coin is the one of the next higher denomination to th 5-cent nickel it possesses obvious advantages from thi point of view.

The principal argument against the 10-cent fare fo a uniform fare is of course its amount and the exten to which it may discourage traffic, particularly the short haul business. It is not the purpose here to discus the relative merits of flat fares versus zone fares fo urban service to stimulate short-distance riding, bu the question of tickets and cash fares in a propert which has a flat fare. For such conditions many companies favor the 10-cent fare and believe that the benefi of any reductions should go to the frequent ride through the establishment of a ticket rate. Such plan makes the casual customer and the stranger pa the higher retail rate, whereas the regular user gets th discount usually accorded to wholesale purchasers i other lines of business. Another advantage of th ticket rate is that it allows changes of small percentag in the rate, either up or down, by a change in the number of tickets sold at a stated price.

The new plan of the Boston Elevated Railway now being tried in Malden and Everett carries out the policy outlined so far as the single coin fare is concerned because 5 cents will be charged for the local suburban ride, while 10 cents will be charged for the long urban ride into Boston.

More Business for the Interurbans

MORE business requiring more car-miles of service and resulting in better car-mile earnings is what is most needed by the interurban railways. But how can it be had?

More business can be secured if a company is prepared to go after it determinedly with the kind of service that is wanted. This means prompt and efficient freight service and fast, comfortable passenger service with a very great extension of through runs. The matter of service is now more important than ever because the steam railroads, faced with a tremendous falling off of both passenger and freight haulage, are going to almost any ends to secure business. This applies particularly to the freight business, where it is always possible to make offers of service more attractive to shippers than given heretofore, and to make good on such offers during dull times. This points to the absolute necessity for the electric freight carriers to be very much "on their toes" in keeping the service up to a high order of excellence for present patrons, and in waging a very energetic campaign for any new business in sight. In other words, the competition of the present time is extremely keen, and it can be met only with a traffic department that is wide awake and backed up by an operating department well aware of the kind of service it must deliver to meet the situation.

Cultivation of the farmers is productive of a good quantity of profitable business. The farmers of Indiana wanted electric freight service badly enough to secure passage of a bill permitting the interurbans to haul livestock through the streets of any city. The service which the electric lines can give the farmer saves him money through substantial reduction in shrinkage of stock. This kind of business, together with all of the sugar-beet, garden produce and dairy product shipments that may be secured (and best secured by encouraging the building by the farmers of community sidetracks) makes a total of freight tonnage well worth going after. Little informal way-station meetings of an official of the company with a group of farmers, serving to give the latter an intimate contact with the company and an opportunity to voice their needs and petty complaints, are of wonderful value in winning friends for the company and incidentally business.

Special attention to through train service as a means of increasing the passenger business is worthy of consideration. Two recent efforts along this line will show in fewest words what can be accomplished. Two new fast through trains between Indianapolis and Fort Wayne recently inaugurated were carrying seventy-five passengers a day each way in less than thirty days, and it soon became necessary for the cars to haul trailers. During the first forty-five days of operation, only three trains were late. The cars are cleaned inside and out at each end of the trip, as with the treatment given in the yard service of the Pullman cars. The character of service undoubtedly had a great deal to do with the success attained. More recently the through service inaugurated between Indianapolis and Louisville, with fine new cars running on a fast schedule, has met similarly with almost immediate success.

These are just a few of many things that are available for interurban lines to do to improve their financial conditions. It is not as though there were nothing left to do. The main point is to get busy and set aside the old obstacles that have been permitted for years to stand in the way. If there is determination, it will be found that most of these obstacles are not controlling.

Take Up the Slack in the Railway Industry

MR. HOOVER was the logical man to head an investigation into the causes of industrial waste. His regulations during the war, exemplified by his call for a "clean platter," taught the public the evils of waste, and it is notable that the first extended undertaking of the Federated American Engineering Societies under Mr. Hoover's direction should be to study the causes and attempt to reduce the waste in industrial undertakings. There are many of these causes of industrial waste. They include unemployment, failure to secure maximum output from the individual due to misfit or other cause, lack of standardization, mismanagement, failure of industries to co-ordinate, and so on. All of these are being studied in ten representative industries by the Federated Engineering Societies to see what relief can be obtained.

The electric railway industry should profit directly and indirectly from this investigation—directly from the lessons which will be derived, indirectly because in periods of business stress its traffic falls off, since the public does not have the money to spend on carfares. The benefit to the nation of having all its productive energies utilized, or with even half of the present waste eliminated, should be tremendous. Waste is the biggest tax the nation has to pay, and it is hard to imagine anything which would add more to our national prosperity than greatly to reduce the size of this tax.

The railway industry will be prepared to do what it can to co-operate when the report of this committee is rendered. In the meantime causes of wastes where detected should be removed in the general interest.

Quotation from the Federal Electric Railways Commission Report

No. 14

THE commission is unanimous on this point: That there has not been sufficient experience with public ownership and operation of street railways in this country to enable us to recommend it as a permanent solution of this problem. In some of the foreign countries it has apparently worked well. We do not believe under present conditions that this method of operation would be successful in most of the cities of the United States today.

* * * * * *

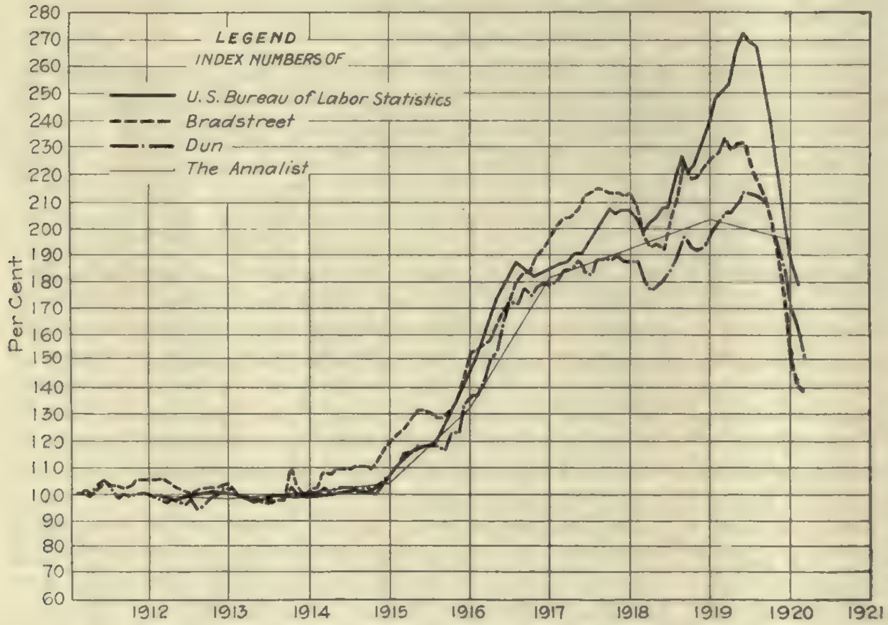
We are certain that much can be accomplished by private initiative, stimulated and aided by thorough public regulation; that the final solution could, in many communities, be found under private management, and that in any event, the reforms which have been urged by the commission should be instituted, since those reforms would serve to place the relations between the street railway and the public upon a more just and equitable basis.

Living Costs and Wages

The Standard Index Numbers Are Charted by Months for the Period Beginning Before the War and Show a Marked Falling Off in Prices Since the First Half of Last Year—Figures Are Also Given for Wages and Unemployment

BY JOHN F. LAYNG
Member of the Firm of Hemphill & Wells, Consulting Engineers, New York

NEARLY every newspaper now contains some reference to wage reductions, decreased living costs and the financial embarrassment of the local traction system. The question naturally comes up, what can we find out about these things which are a matter of universal concern? Let us consider, first, the street railway situation. This can be understood in a few minutes, if we have the company's operating report. Very few of these companies have been meeting their capital obligations. Many have not had sufficient income to pay operating charges, the deficit being made up by borrowed money and deferred maintenance.



FLUCTUATIONS IN WHOLESALE PRICES OF COMMODITIES

The reason for so many unfavorable operating reports is the abnormal increase of labor and material costs within recent years without a corresponding increase of income. It is the purpose of this article to show the extent of this increase and the present trend of these prices.

There are definite and reliable guides of the trend of retail prices on which we can base our judgment. These are the index price numbers of the five leading authorities in this country, which are Bradstreet, Dun, the Annalist, the United States Bureau of Labor Statistics and the National Industrial Conference Board. Each of these will be considered individually.

BRADSTREET'S INDEX PRICE

Bradstreet takes the wholesale prices of ninety-six basic commodities, which are supposed to be representative of average price conditions in trade. These articles include breadstuffs and other foods, live stock, raw and manufactured textiles, metals, coal and coke mineral and vegetable oils, naval stores, building materials, drugs and chemicals, and miscellaneous articles The wholesale price per pound of each article is liste and the totals added. The grand total is Bradstreet' Price Index Number. If the figure for Jan. 1, 1912 is taken as 100 per cent, the wholesale high level pric during the recent abnormal period was 233.1 per cen this being on Feb. 1, 1920. On April 1 prices ha dropped to 231.4 per cent, but on May 1 prices wer 231.6 per cent. Since that time they have declined very rapidly and on Feb 1, 1921, they had receded to 138 pe cent. The various fluctuations mont by month from 1912 to the presen are shown graphically in the char on this page.

DUN'S INDEX NUMBER

Dun's Index Number has the scientific foundation of a proper regar for the relative importance in pe capita consumption throughout the country of each of the many articles used in its compilation. On the business day nearest to the first of every month about 300 wholesale quotations are taken, and these are separately multiplied by a figure determine upon as the estimated per capita consumption of each of the many commodities embraced by the record. The results are then grouped under seven heads, the total of all representing the actual cost of a given quantity of goods in the wholesale markets at the specified dates Through the use of a per capita consumption factor in this index number, wide fluctuations in an article little used do not materially affect the total, whereas changes in the great staples have a larger bearing on the general result. The per capita consumption multipliers used do not change with the varying prices. If Dun's Index Number of January, 1912, is taken as 100 per cent the highest wholesale prices were reached in May, 1920, when the value was 213 per cent of the January, 1912, prices. Since then prices have continually dropped, until in February, 1921, the value was 150 per cent.

THE ANNALIST INDEX PRICE NUMBER

Wholesale quotations of twenty-five food commodities are used as the basis of this index number, the articles being so selected as to represent a theoretical family food budget. The prices used are New York and Chicago quotations. The index price number is obtained by computing the simple arithmetical mean of the relative prices of the different commodities.

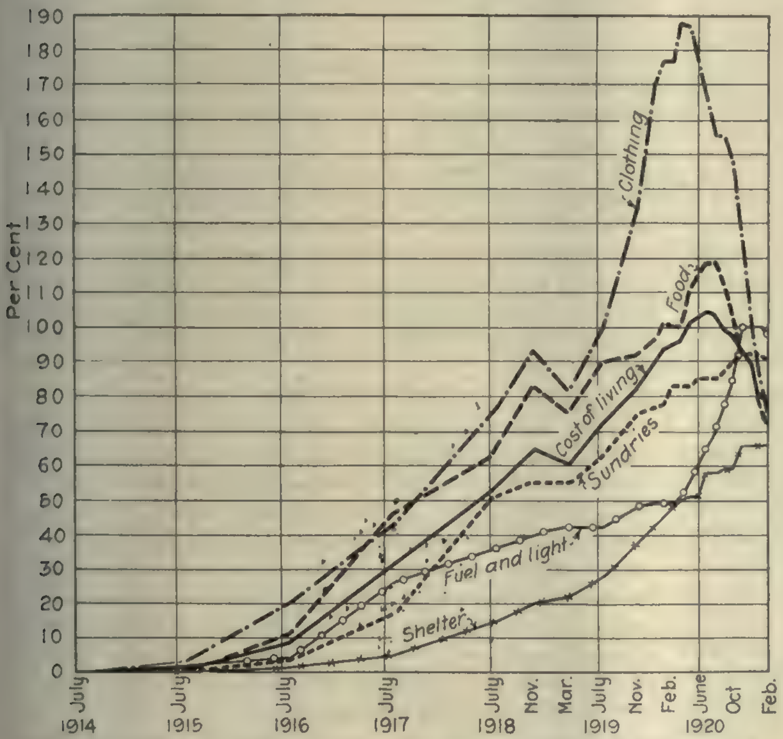
These figures, considered on year averages with 1912 as 100 per cent, showed the 1919 wholesale prices to have advanced to 203 per cent. The highest average price for any single month was in June, 1920, when the figure was 231 per cent of the 1912 prices. The average for 1921 up to Feb. 19, 1921, was 135 per cent of the 1912 figure. Year averages are given in the chart.

UNITED STATES BUREAU OF LABOR STATISTICS INDEX PRICE

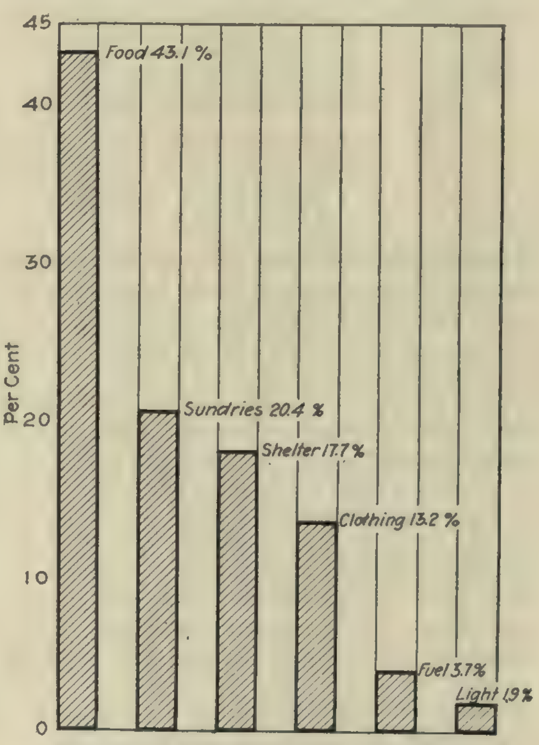
The wholesale price of more than 300 commodities are used as the basis of this index price, the quotations being principally at New York and Chicago. No attempt has been made to weigh the index number. Instead, it has been thought best simply to use a large number of representative articles, selected in such a manner as to make them to a large extent give the time value of price fluctuations in basic commodities.

NATIONAL INDUSTRIAL CONFERENCE BOARD

One of the important activities of this board is an investigation of living costs. One fundamental difference between its index number and those of Bradstreet, Dun, the Annalist and the United States Bureau of Labor Statistics is that the board bases its figures on retail prices rather than wholesale prices,



FLUCTUATIONS IN COST OF LIVING IN THE UNITED STATES AS REPORTED BY NATIONAL INDUSTRIAL CONFERENCE BOARD (PERCENTAGE ABOVE THAT IN 1914)



RELATIVE PERCENTAGES OF EXPENSE ITEMS COMPRISED IN THE AVERAGE FAMILY BUDGET

The relation of wholesale prices to retail prices is similar in many ways to the relation of retail prices to wage rates. There is a lag between the raising and lowering of wholesale prices and the reflection of this change in retail prices. Furthermore, retail prices are more a matter of personal selection than wholesale prices. This phase must be considered in any conclusion based on wholesale prices.

Another point of difference between the index figure of the National Industrial Conference Board and the other index figures mentioned, except Dun's, is that it represents a weighted average. The figure is made up of the retail prices for food, shelter, clothing, fuel and light, and sundries, weighted in the proportion which these have in the budget of an average family.

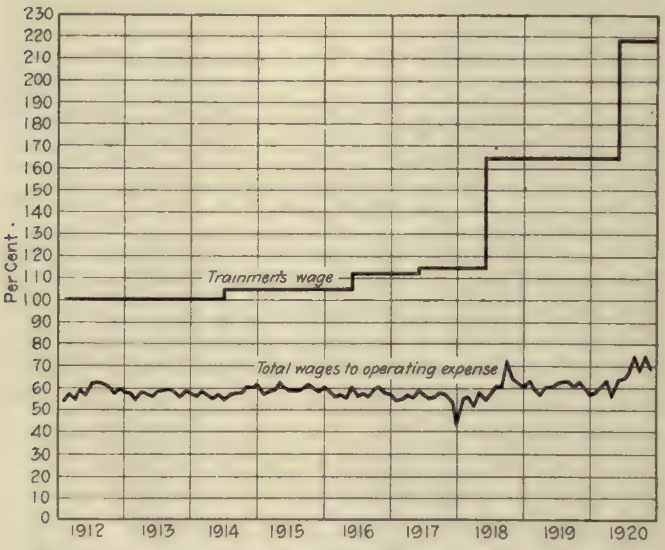
The food prices are obtained from the Statistical Bureau, United States Department of Labor. Clothing prices are based on data secured direct by the board from wide sources of information in various parts of the country. Prices for fuel, light, shelter and sundries are secured in the same manner as clothing prices. "Sundries" include carfare, doctors' fees, church contributions, organization dues, insurance, medicines, reading material, amusements, furniture, household supplies, candy, soft drinks and tobacco. The figure taken as the relative importance of these articles in the average budget is food 43.1 per cent, sundries 20.4 per cent, shelter 17.7 per cent, clothing 13.2 per cent, fuel 3.7 per cent, and light 1.9 per cent.

These figures and their total are shown graphically in the second chart. In this chart July, 1914, is taken as zero and the peak of retail prices will be found as having been reached in July, 1920, when the figure was 104.5 per cent above that of July, 1914. Since that time prices have been rapidly going down, and on the same basis as that just quoted the prices as of February, 1921, are 76.3 per cent.

The graph of costs of the National Industrial Conference Board shows that the principal reduction in living costs during recent months has been in food and clothing. Up to date the reduction in sundries, fuel and light has been small. The costs of these and of shelter are more involved than those of food and clothing, and considerable time will probably be required before they fully reflect the downward trend of prices. The public sentiment is also a large factor in the price of these items.

The highest prices for each of the various authorities were as follows: Bradstreet, February, 1920, 233.1 per cent; Dun, May, 1920, 213 per cent; the Annalist, June, 1920, 231 per cent; United States Bureau of Labor Statistics, May, 1920, 272 per cent, and National Industrial Conference Board, July, 1920, 104.5 per cent. As this last percentage represents the value above that of July, 1914, to be on a comparable basis with the others it should be read as 204.5 per cent.

Trade papers state that the prices of commodities in Great Britain and other foreign countries are declining in practically the same ratio as here and any view of the situation should consider conditions on a broader basis than just what is happening in this country.



ABOVE, AVERAGE TRAINMEN'S WAGE RATE FOR TYPICAL COMPANY COMPARED WITH THAT PREVAILING IN 1912. BELOW, RATIO OF TOTAL WAGES TO OPERATING EXPENSE

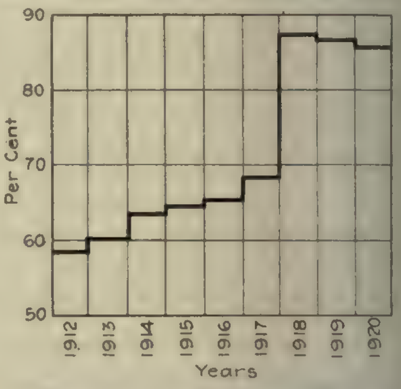
Only one conclusion can be reached from the charts shown. This is that wholesale prices have been off for some time and retail prices are rapidly going down and their trend is to a still lower level than the present. Several months are usually required before reductions in wholesale prices show up fully in retail prices. There is the natural tendency for the retail merchant to hold up his price at least until all the stock which he has purchased is sold. Again, his expenses for rent and wages, up to the present, have not been reduced in the same ratio as either wholesale prices or as the wages in industrial establishments. But as it is only natural to assume that the merchants' employees will receive a wage which will be in proportion to the other wages paid in the district, the cost of living in the near future will be in accord with the trend of wholesale prices.

WAGES AND UNEMPLOYMENT

In its January bulletin the United States Department of Labor declares that unemployment is at present assuming very serious proportions. In January, 1920, there were 9,402,000 employees in industry in the United States. This number for January, 1921, had decreased to 6,070,648, or 35 per cent. Other unemployed persons brought the total up to 37 per cent. The same bulletin reported general wage reductions in many cases of 20 to 33⅓ per cent. How far this will be reflected in wage rates for the electric railway industry is problematical, but if the cost of living is reduced in the same proportion as wages no personal hardship should result.

In 1912 the total wages paid to electric railway employees amounted to 50 or 55 per cent of all the operating expenses, excluding taxes. At present this figure has advanced to from 67 to 75 per cent. This increase in wages with the increased material cost coming at the same time are the two principal factors in making the adverse operating statements of practically all electric railways today.

Very few companies have received increases in fare rates that return a sufficiently large gross to overcome the increased operating costs. A company which may be classed as typical of the industry illustrates the points mentioned. The results of increased wages paid and the percentage of trainmen's wage rates are plotted in a fourth graph which shows about 72 to 75 per cent of total operating costs. The operating ratio for this company advanced successively year by year from 58.5 per cent in 1912 to 87.25 per cent in 1918. For 1920 this figure was 85.5 per cent. The margin between success and failure of a street railway as measured in operating ratio is in reality very small. Before the days of abnormal costs, generally speaking, a company having an operating ratio below 60 per cent, all expenses being included, was considered as making a good financial showing, while one with an operating ratio of 70 per cent or above was thought to be headed for a receivership. So it can be realized that a difference of 15 per cent spells failure or success.



OPERATING RATIO FOR TYPICAL COMPANY, SHOWING ADVERSE EFFECTS OF RISING COSTS

CONCLUSION

When one views all the evidence at hand the conclusion is that the cost of living will come down. Wages in all probability will be revised downward, but if the living cost is down, a corresponding reduction in wages ought not to be considered as serious by the employee.

As living costs tend to become stable on a lower price basis, general contentment will increase and society at large will in all probability be better satisfied with the revised conditions. When a dollar approaches nearer to the old purchasing basis, the increased wage which we have had will not be so necessary.

Work of Committee to Study Waste in Industry Well Under Way

A RECENT statement by L. W. Wallace, secretary Federated American Engineering Societies, indicates that the work of the committee of that society appointed to study the causes of waste in industry and means by which it can be eliminated is well under way. Ten representative industries have been selected for study, namely: Bituminous coal, building trade, transportation, men's ready-made clothing, printing, paper, metal trades, textiles, shoes and rubber. From three to ten plants of each elected industry are being visited by an experienced engineer under the direction of the committee. From the information obtained the committee hopes that it will be able to determine the extent, causes and remedy for unemployment.

Railroad Engineers Meet in Chicago

At Twenty-second Annual Convention of American Railway Engineering Association Held in Chicago March 15-17 Committee Reports Were Presented Covering Wide Range of Topics—Those of Particular Value and Interest to Electric Railway Engineers Are Abstracted in This Article

THE committee reports presented at the twenty-second annual meeting of the American Railway Engineering Association held at the Congress Hotel, Chicago, from March 15 to 17, contained a mass of material of value in the electric railway field. Abstracts of a number of these have been prepared from the point of view of the engineers interested in railway electrification or of the way engineer.

In discussing the report of the committee on electricity E. B. Katté, chairman of this committee, said in regard to the specifications given for insulated wires and cables that these were not written to supersede the signal specifications, but that it was the desire to have one specification that is applicable to all the various uses of electric insulated wire, and perhaps this may be brought about in the course of a few years. The committee which made the test in connection with the result and analysis was made up of representatives of four or five railroads, the United States Navy, the United States War Department and four or five manufacturers and after years of research they have finally agreed on a procedure which is fairly accurate. The railroad specifications for electric wires and cables and the specifications for incandescent lamps were approved for printing in the Manual as recommended practice.

The report on economies of railway location was presented and outlined by C. P. Howard, chairman. The text included under Appendix A and the conclusions reached were adopted for insertion in the Manual. The remainder of the report was received as information.

The work of the ballast committee for the past year was largely in the nature of a review of the instructions given in last year's report as information and was presented this year for adoption and inclusion in the Manual. Appendices B, C, D and E were adopted for printing in the Manual as recommended practice.

Nine subjects were assigned to the track committee this year and reports were presented on six. Recommendations adopted for printing in the Manual as recommended practice included spikes, both the $\frac{5}{8}$ in. and $\frac{9}{16}$ in.; specifications for switches, frogs, crossings and guard rails; a revision of tables of turnout leads and the plans of standard frogs.

An important development of the meeting was a letter sent by the chairman of the committee on rail, G. J. Ray (D., L. & W. R.R.), supplementing the committee's report. Mr. Ray, who was unable to be present, stated that no rails have yet been rolled to the specifications adopted in 1920 owing to the action of the manufacturers, who will not accept these specifications for rails of more than 110 lb. per yard and will only meet them for rails of less weight subject to certain modifications and an extra price. Mr. Ray believes that some of the claims of the manufacturers are reasonable, but on the other hand they have offered no constructive criticism of the specification. Their general attitude is that their own specifications and the 1915 specifications of the association are satisfactory, that the 1920 changes will prove costly without improving the quality of the rail and that railways are not sufficiently interested in securing better rails to pay the extra cost of production. No action was taken or requested, but the committee this year will consider whether to adopt two specifications (for different grades of rail) or to adopt a single specification which will not require extra cost but will be accompanied by a list of specific requirements and their probable cost, for the benefit of railways requiring rails of higher grade.

The report of the committee on wood preservation this year was full of information without any recommendations for the Manual. A part of the report that should appeal to all maintenance engineers is that given in Appendix A on service testing records. These records have been compiled from experimental track in most cases and cover three different treatments.

Electricity and the A. R. E. A.

TAKING up first the problems of power distribution as covered in the report of the committee on electricity, it may be noted that this committee, of which E. B. Katté is chairman, gave the results of its year's studies on such topics as electrolysis, water power specifications for insulated wires and cables, electrical interference, underground conduit construction, etc. As recommendations for new work, the committee suggested co-operation with the United States Geological Survey in connection with the "super-power survey" and also with the Water Power League of America and advocated study and report on overhead transmission and distribution line construction for railroad use, with a view of preparing plans and specifications for aërial construction, working with appropriate committees from the signal section and telegraph and telephone section of the American Railway Association.

In reporting on the protection of reinforced concrete from electrolysis, the committee stated the conclusion that the protection of a concrete structure with a waterproof shell is preferable, because this not only safeguards the reinforcing bars from moisture and later oxidation, but also protects the concrete surrounding the rods from abrasion and eventual exposure of the bars. The inside of the protecting shell should be waterproofed with pitch having a melting point about 200 deg. F. and of specified flexibility. Material of the required kind has been manufactured for twelve years or more, but has not generally been used for waterproofing but mainly as roofing material and in pavements. It is necessary not only to inclose the sides of the reinforced concrete structure with a waterproof shell but also to protect the top or any other portion that is exposed by means of a waterproof pitch.

The sub-committee on water power presented data regarding the Norfolk & Western Railway electrification, which was stated to have been decided upon primarily to secure greater facility of movement in a given time. It has also developed that the economy of electric operation is an important factor. Provision was made for interchange of emergency power between the railway steam plant located near Bluestone and the Appalachian Power Company's plant at Switchback. Charts were given in the report for typical fall and spring days, showing respectively for the two the following data: Total alternating current kilowatt-hours generated, 25-cycle, 353,500 and 249,800, and 60-cycle, 936 and 1,056; total alternating current kilowatts load for five minutes, 18,500 and 21,000; average power factor, 70 per cent and 65 per cent; load factor for five minutes, 79.6 per cent and 49.5 per cent; load factor for one hour, 85.6 per cent and 72.7 per cent. The high load factor in the first case is due to a large supply of emergency power to the power company.

The outstanding features of the Norfolk & Western electrification are the irregular spacing of trains and the ability of the generating equipment to supply large blocks of power on short notice. There have been instances where the power-house load has increased from 2,000 kw. to 25,000 kw. in less than five minutes.

Previous to electrification a standard tonnage train of 3,250 tons required three Mallet locomotives up a 2 per cent grade, making an average speed of 7½ m.p.h., while with electric locomotives the same train is handled by two engines at 14 m.p.h. Under steam conditions the round trip time of a crew out of Bluefield averaged twelve hours, while with electric operation it averages seven hours. Under steam conditions the time required to prepare a Mallet locomotive for a trip was from ten to twelve hours, while with electric locomotives forty minutes is allowed.

The report also gave comparative costs of steam and electric operation on the basis of 1,000,000 tractive miles, "tractive miles" being the product of the maximum tractive power in pounds and the total miles run. The respective amounts for steam and electricity for the several items of cost are as follows: Interest and depreciation $4.36, $12.16; repairs $7.64, $6.40; fuel of electric power at locomotives $13, $6.19; lubricants and wastes 16 cents, 5 cents; supplies 16 cents, 16 cents; engine-house expenses $2.18, 56 cents; water 51 cents, nothing; wages $1.89, 70 cents; total per 1,000,000 tractive miles $29.90, $26.20; saving by electric operation 12½ per cent.

With regard to fuel saving, the Norfolk & Western found that the modern Mallet compound superheating steam locomotive, equipped with all improvements except feedwater heaters, uses about 5.4 lb. of fuel per drawbar horsepower-hour, taking into account road conditions and allowing for standby losses, and assuming the engine to be in fairly good operating condition. With electric operation about 3.3 lb. of fuel is required. The annual saving for the present Elkhorn grade electrification is about 60,000 tons of fuel coal per year. The corresponding saving for the entire Norfolk & Western system would be nearly 1,000,000 tons per year. For the period January to June, 1920, the total mileage for an average of eight locomotives was 224,974, or 135 miles per locomotive per day. The kilowatt-hours at the power house per locomotive-mile averaged 160, and the watt-hours per trailing 1,000 ton-mile, 165.

After giving the Norfolk & Western data, the subcommittee concluded as follows:

1. That the use of 44,000-volt, single-phase, 25-cycle transmission of electric power with 11,000 volts single-phase on the trolley wire is practicable for electric trai service for heavy grade and heavy tonnage.

2. That the average daily gross tonnage of freigh eastbound over the electrified grade on the Norfolk & Western for 1918 was 47,500 tons as compared with 32,000 tons in 1912, an increase of about 50 per cent The ultimate capacity based on the present installatio is stated as 80 per cent over that of 1912.

3. That such a system of electrification will probabl effect the saving of at least 12½ per cent of the tota annual expense as compared with steam operation on railway with similar characteristics.

4. That the introduction of electric locomotive with electric brakes (regenerative braking) has made possible higher speeds on heavy grades with greater safety and reliability under all climatic conditions.

In addition to the report of the committee on electricity there was a section of the report of the committee on economics of railway location which discussed electrical equipment. This is abstracted on pages 634 and 635. It relates to the economics of location as affected by the introduction of electric locomotives.

ELIMINATING ELECTRICAL INTERFERENCE

Another sub-committee, charged with the duty of reporting on recommended practice for eliminating, so far as practicable, interference with telephone, telegraph and signal lines caused by propulsion circuits and adjacent transmission lines, gave the results of questionnaire. No conclusions were drawn, but the interference situation on a number of roads was summarized.

On the New Haven Railroad a "three-wire" system of distribution is used, with the terminals of 22,000-volt auto-transformers connected to the overhead wires the center point of these transformers being grounded to the rail. `One terminal of the transformers is connected to the trolley wires, the other to the feed wires Communication circuits are cabled in the electrified zone. Under normal operating conditions telephone circuits are quiet, but on the occasion of a heavy short circuit on the traction system, so-called "acoustic shocks" have been experienced. To minimize these drainage coils have been installed at various points along the line, these coils consisting of resistors or condensers in series with retardation coils. No trouble chargeable to induction has been experienced in connection with the automatic signals.

On the Philadelphia-Paoli electrification booster transformers were installed to prevent leakage of current from rail to ground, but were found of little value and practically all have been removed. All telephone and telegraph circuits are underground. Resonant shunts are used around relays on the telegraph circuits which provide a bypass for 25-cycle current. On the Philadelphia-Chestnut Hill electrification no booster transformers were used and no trouble has been experienced in telephone and telegraph circuits.

On the Long Island Railroad, which is a direct-current third-rail electrification, the transmission feeders are parallelled by telephone and telegraph circuits throughout almost their entire length. The open-wire telephone circuits are transposed at regular intervals, usually about eight transpositions per mile. The only inductive interference in the communication circuits is an occasional trouble due to unbalancing of power circuits, usually of short duration.

On the Norfolk & Western the company's telephone and telegraph circuits are open wire along the right-of-way, forming a close parallel to the contact and transmission circuits. Under normal conditions the inductive interference has been overcome to a very large extent on telegraph circuits by installing drainage shunts. This in conjunction with the special booster-transformer installation on traction circuits has cut down interference to a minimum; the only direct protection on railroad telephone circuits is transposition.

On the Great Northern three-phase electrification through the Cascade Tunnel the transmission line parallels the pole line supporting telegraph and signal line circuits, generally at a distance of from 80 to 90 ft. Interference with telegraph circuits, which was troublesome at first, has been overcome by the use of a twisted-pair steel armor communication cable.

On the Erie Railroad electrification south from Rochester, N. Y., interference occurs on a section 19 miles north of the transformer station located at Avon and 15 miles south thereof. Normally there is no disturbance from the transmission line, but induction from the 11,000-volt single-phase line is heavy on all single telegraph wires which come into this section. Under abnormal conditions the troubles are accentuated.

On the New York Central Railroad, West Shore branch, there is a parallel between the railroad's communication circuits and the 60,000-volt, three-phase, 60-cycle transmission line for about 115 miles, which normally causes no trouble. Under abnormal conditions severe surges are induced in railroad communication lines. On the Falls Road branch a short parallel causes trouble only due to contact. There has been some interference due to irregular power conditions on the parallel 20 miles long on the Walkill Valley branch, and a similar trouble on the Phoenix branch. In the Grand Central terminal electric zone 11,000-volt, three-phase, 25-cycle alternating-current power is transmitted to nine substations, partly on aërial lines and partly in cables. The telephone and telegraph lines are in cables in the same sections where the power line is cabled. In other sections the communication lines are part cable and part open wire on the side of the track opposite to the transmission line. There has been no electrical interference with communication or signal service.

On the Chicago, Lake Shore & South Bend Railway, extending from Kensington, Ill., to South Bend, Ind., the railway company's communication and signal circuits are carried on the same pole line as the transmission circuit without trouble. The Postal Telegraph & Cable Company's line parallels this road between West Blair Farm and Baileytown. Only under abnormal conditions due to short circuits and grounds are momentary troubles experienced on the telegraph circuits. The trouble is greatest when the railway company cuts out its 33,000-volt lines and carries the whole load on the system from the 6,600-volt, single-phase contact wire. Nothing has been done by the Postal company which eliminates these conditions.

SPECIFICATIONS FOR CONDUITS AND CABLES

The committee on electricity also presented railroad specifications for underground conduit construction for power cables, recommending that it be approved and printed in the Manual of Recommended Practice. The committee further recommended that the report on the National Electrical Safety Code, which outlined the present status of the code, be accepted as information and published in the *Proceedings* and that the committee be authorized to continue its co-operation with the United States Bureau of Standards. The committee further recommended that railroad specifications for wires and cables, which is presented, be approved and printed in the Manual as recommended practice. In connection with underground conduits, three new electrical definitions were suggested as follows: A *conduit* or *duct* is a unit length of pipe suitable for use in the construction of runways for electric light and cables. A *manhole* is an opening in a splicing chamber through which a man may enter. A *mandrel* is a tool for aligning and cleaning ducts.

The above abstract does not take up all of the detail items of the report, but refers particularly to those which will interest electric railway men.

Economics of Location as Affected by Introduction of Electric Locomotives

AN APPENDIX to the report of the committee on economics of railway location C. P. Howard, chairman, gave a summary of the advantages and disadvantages of the electric locomotive, beginning with the statement that railroad electrification, while most desirable from the point of view of the conservation of our fuel resources, is a matter that cannot be taken wholesale on account of the capital outlay required and the individuality of the problems of different railroads. At the same time, recent improvements in the steam locomotive have increased its efficiency practically 50 per cent, while its size and capacity have increased correspondingly.

The electric locomotive eliminates the turntable, cuts down standby losses, removes delay at water tanks and coaling stations, is more readily available than the steam locomotive for service, and its maintenance cost is lower. Its capacity increases with cold weather, and the simplicity of its control permits the crew more closely to observe the track and the signals. When properly designed the electric locomotive is easier riding than the steam locomotive and can have a more uniform distribution of weight with less nosing and track pounding, all of which tends to lower track maintenance. In addition the electric locomotive can concentrate large amounts of power under single control.

In steam locomotive operation each train has its own source of power which has no relation to the propulsion of the other trains on the line. In electric railway operation every train draws its power from one or more centrally located power houses. Steam trains are handled by locomotives only; electric trains may be propelled either by locomotives or motor cars.

ADVANTAGES OF ELECTRIC OPERATION

The committee summarized the actual and claimed advantages of electric operation in substance as follows:

The smoke nuisance is entirely eliminated. The entire weight of the locomotive can be concentrated on the drivers. Tractive effort can be increased without decrease in speed. Train weights from 18 to 25 per cent greater than is possible with steam locomotives can be hauled. The electric locomotive does not need to be taken out of service for cleaning, coaling, watering, etc., at terminals. Fuel consumption is low, but in comparison with steam locomotives all elements of power cost should be included. Unit cost of electric operation decreases with increase in volume of traffic.

The committee generally listed the handicaps to which the electric locomotive is subject somewhat as follows:

Electric equipment is costly, and it must bring about a great reduction in operating cost to justify its use. The electric locomotive is a transforming apparatus and is subject to overload, which the steam locomotive is not. Electric operation involves extra hazards to employees and others. An electrified system is liable to train delays inherent to the system, both due to equipment failures and power transmission line and power house failures. (The committee noted, however, that these delays are rare.) With electric traction, alternating-current track-circuit apparatus must be used for signals. Normal traffic cannot be exceeded for long periods unless the system has been designed to take care of maximum traffic. The power system load factor is apt to be low unless other load is carried. Electric locomotives are limited in their field of operation strictly to electrified track and so do not have the element of interchangeability possessed by steam locomotives.

As to comparative efficiency of the electric and steam locomotives in the matter of failures, the committee stated that the electric locomotive seems to hold its own. However, the steam locomotive has recently become a more formidable competitor due to the development of improvements, particularly the various outside valve gears, the superheater, the brick arch and the automatic stoker. It would appear that the ton-miles moved by 6½ lb. of coal in a steam locomotive are approximately equal to what can be moved by 1 kw.-hr. delivered from a power station, varying of course with the quality of the coal. In most cases the profits from electrification must be realized indirectly rather than directly, for example, from increased track capacity and the like. Steam railroads will generally consider electrification favorably when the reduction in operating expenses will pay the interest on the necessary investment; also when the track capacity must imperatively be increased, and this increase can only be supplied by a large additional expenditure or by electrification.

As to location economics, the introduction of electric traction will require changes in the economic values heretofore assumed under the classified heads of "distance," "rise and fall," "curvature" and "rate of grade." These topics were discussed in the report in some detail. The committee concluded that, taking into consideration heavy fixed charges of investment, no general conclusion can be given at this time as to the relative economies of electric and steam operation. Each case must be considered by itself, with due regard to all elements of cost and expense, both special and general, as well as operating conditions and the public comfort and safety.

Committee Reports on Way Matters

THE following abstracts cover the reports on track and allied topics. For convenient reference they have been arranged under the committee titles:

Committee on Ballast: The committee presented revisions of subject matter in the Manual; intruction for ballasting on operated line; specifications for stone ballast material and washed gravel ballast, recommended designs for standard ballast tamping bar, pick and fork. A design of standard ballast shovel was submitted for study.

Committee on Stresses in Track: A progress report was made stating that important information on stresses developed in curved track is in process of preparation for future report.

Committee on Rail: The committee presented its customary report on rail failure statistics. Continued effort has been devoted to the search for the causes of transverse fissures. The investigation has indicated that the trouble may ultimately be traced to shrinkage cracks which occur during cooling, after passing the hot saws. A critical study is being conducted to determine the influence of mill practice on the properties of rails. The committee submitted new rail record forms to replace those now in the Manual. Some tests by Dr. Dudley show that there is a high residual ductility in rails even after five years of severe service. It is stated that tests for determining intensity of pressure on rail heads show that the pressure is least where the wheels are worn slightly concave.

Committee on Economics of Railway Labor: This committee stated that very little is being done by the railroads in exercise of care in selection of maintenance labor. There should be immediate action looking toward improvement of the labor situation and organized effort must be put forth to increase labor efficiency through education and training. The average age of roadmasters and track supervisors is forty-five years. Fifty per cent of the roadmasters and supervisors have had some engineering training. They each have charge, on an average, of 111 maintrack miles and 75 sidetrack miles. Ninety per cent of the common labor is composed of native white men. The average length of track section per foreman is 6.7 miles maintrack and 3.1 miles sidetrack.

Committee on Standardization: A new and special committee has been appointed to assist in the promotion of the use of the association standards. The committee is to review specifications heretofore adopted and suggest subjects which need joint study by the several standing committees. The committee is also to suggest items of railway material which should be covered by standard specifications.

Committee on Uniform General Contract Forms: A number of revisions of the contract form now in the Manual were proposed. A tentative form of license for wires, pipes, drains and conduits on railroad property was submitted for criticism. A form of lease agreement for industrial sites was recommended for adoption.

Committee on Signs, Fences and Crossings: A number of changes were recommended in the specifications for standard right-of-way fences. Designs were submitted and recommended for adoption, covering a number of signs for mileposts, section sign, bridge numbers, etc. A tentative specification for highway grade crossings was submitted and a summary of the requirements and practice in the various states and in Canada was presented. There was also an extended discussion of crossing gates, warning signals, wigwags and bells. A matter of particular interest is the revision of the statement of laws relating to separation of grades at highway crossings. Electric railways are subject to these laws and this information forms a valuable record of the variations in the laws in apportioning costs and methods of procedure. The bibliography on elimination of grade crossings should be of great assistance to engineers having occasion to gather information on the subject.

Committee on Ties: A number of changes in definitions were recommended. None of the railroads use the specifications for cross-ties and switch-ties now in the Manual. New specifications have been prepared and submitted for adoption in lieu of those now in the Manual. It is recommended that test sections for obtaining records of tie life be put in "out of face" and that not less than 100 ties of each kind be installed.

Descriptions of methods of inspection and the essentials for keeping adequate records were presented as information, and there was an extended discussion of the relative merits of various sizes of ties.

The subject of substitute ties received a good share of attention, and the committee called attention to the desirability of extended tests, believing that the engineering departments should take a more active interest in the development of substitute ties. Records of the various ties now under test were brought up to date. The committee called attention to its special report on the "Relative Merits of Metal versus Wooden Ties." This report was abstracted briefly in the ELECTRIC RAILWAY JOURNAL last year.

Committee on Iron and Steel Structures: This committee presented rules and unit stresses for rating existing bridges for approval. These rules have been under discussion for several years. The formula for impact is of particular interest to bridge engineers. Also, the principles applying to membrane waterproofing of bridge floors were discussed and submitted for approval. Particular attention must be given to drainage, reinforcement flashing and protection.

Committee on Water Service: The study of regulations relating to supply of drinking water on trains or premises of railroads brings out the fact that federal and state authorities are taking an increased interest in matters pertaining to drinking water supplies. The sanitary handling of such water is said to be in need of careful consideration and should be considered as important as any question of safety appliances. The handling of water to and in containers is a source of contamination. The Bureau of Public Health Service, United States Treasury Department, has requested that water containers be so constructed that ice does not come in contact with the water. The committee submitted specifications for substructures of wood and steel for water tanks for adoption and insertion in the Manual.

Committee on Wood Preservation: A report is made on Florida pine ties of the Public Service Railway which were treated with water-gas tar, fuel-cell treatment and installed in 1911. None has been removed to date and ties are in good condition. The availability of sodium fluoride as a preservative was discussed and the "toxicity" of the material was stated to be twice that of zinc chloride. More experimental installations are desirable.

The attacks of marine borers on piling is more extensive and more severe than formerly. Limnoria and toredo are particularly active. Creosote treatment is quite effective as a protection in some places but in others it is often inadequate and mechanical protection must also be applied. Creosote has so far not been found to stop attacks of limnoria. Various methods of mechanical protection, such as vitrified pipe, cast-iron pipe and concrete casings were described and illustrated in the report. Studding the piles with nails has been found to give protection against the toredo. Bark left in place offers protection for some time.

Committee on Wooden Bridges and Trestles: The committee reported that 16-in. stringers will be available for a long time to come. It is a depth largely used. Piles for trestles should have at least 14-in. butts and be driven to be safe for a load of 15 tons plus impact. The recommended sizes for stringers, caps, posts and sills are given covering Cooper's E45, E55 and E65 loading. Ties should be 8 in. x 8 in. x 10 ft. not dapped, and spaced 12 in. centers. Guard timbers should be 4 in. x 8 in.

Specifications for classification and grading rules for timber and lumber used in maintenance-of-way work were recommended for adoption. A table of allowable working stresses for structural timbers was presented. This covers a large variety of timber species.

Committee on Masonry: Conclusions were presented by this committee covering use of concrete for sea water work. Particular care must be given to designs to avoid sharp corners, offsets or pockets tending to obstruct flow of waves and floating objects. A very dense, impervious aggregate is desirable and the component parts must be carefully selected. Especial attention should be given to design when reinforcement is used. No steel should be nearer than 3 in. to any surface and not less than 4 in. from any two adjacent surfaces.

Committee on Economics of Railway Location: A number of interesting diagrams, tables and conclusions were presented by this committee for adoption, covering the resistance of trains running between 35 and 75 m.p.h.

Committee on Shops and Locomotive Terminals: An extended progress report on design of car shops was presented. A variety of designs of existing shops were illustrated, with a number of tentative conclusions covering such matters as track centers, space allowed per car, supply tracks, clearances, headroom, doors, paint shops, lighting and heating.

Committee on Track: Under "Revision of Manual" some slight changes were recommended by the committee in the design of cut track spikes. The design originally adopted did not show certain details correctly. Designs for $\frac{5}{8}$-in. and $\frac{9}{16}$-in. spikes were presented for adoption. It is reported that these spikes can be made in automatic machines. There had been some trouble about this with the earlier design.

Specifications for switches, frogs, crossings and guard rails were presented for adoption. There were many points in these specifications which are similar to those adopted by the American Electric Railway Engineering Association covering plain bolted special trackwork and materials for manufacture of special trackwork. Data for laying out bolted rigid frogs, railbound manganese-steel frogs and solid manganese frogs are presented and recommended for inclusion in the Manual. Standard dimensions for solid manganese frogs, tables of practical and theoretical turnout leads were also included in the recommendation. An elaborate progress report was made on gages and flangeways for curved crossings. Tentative specifications covering tie plates were presented for criticism.

Committee on Roadway: Subsidence and shrinkage of embankments were reported on extensively by this committee. Some subsidence occurs under an embankment except those built on rock. It is due to displacement or compression of earth under embankment. It must always be expected in swamps, marsh, bogs and any land where there is standing water. Shrinkage is composed for four elements: Wastage due to loss in haul; due to wind erosion; water erosion, and compression. The latter is by far the largest factor. The customary allowance of 10 per cent of shrinkage of earth is very nearly correct. Swell is often found in rock or shale. This may be as great as 60 per cent. No rule for swell can be given for general use. Specifications for corrugated metal culverts were presented for study. These culverts can be used to advantage in numerous instances. A number of conclusions on drainage of wet cuts were presented together with a number of illustrations of methods which are recommended for providing such drainage.

Committee on Economics of Railway Operation: The report of this committee is too elaborate to admit of an abstract which would do it justice. Of interest in connection with "human engineering" is a report on methods for increasing efficiency of employees by furnishing them with reports and comparisons. Methods for increasing traffic capacity of a railway were the subject of valuable studies presented as appendices to the report. The effects of speed on costs of track maintenance and on cost of transportation and cost of maintenance of equipment are subjects treated in Appendix C. It is evident from these reports that speed costs money and requires a better standard of maintenance. Quite definite increases in expense may be expected; operating speeds increase in way department accounts and these run through all of the maintenance accounts from superintendence down.

Committee on Rules and Organization: A manual of instructions for the guidance of engineering parties and a manual of rules for the guidance of employees of the maintenance-of-way department were recommended for adoption. These are to replace all matter on rules and organization now in the Manual. The instructions for engineering parties are very thorough and should be in the hands of all railway engineers. The manual of rules for way employees is prepared with the view of covering matters broadly so that they may be used as a basis for the rules of any way department.

Under the head of "Science of Organization" the committee presented the fundamentals of organization and outlined the two general types of organization now in vogue, namely, the line type and the staff type.

Diagrams or charts of these are given and the charts show the workings of the two divisions of the line type as used by railroads, *i.e.*, departmental and divisional.

Double Circuit Breaker Safety Switch

THE Cutter Company, Philadelphia, Pa., has just placed upon the market a new type of inclosed circuit breaker which serves not only for protection from overload but also acts in place of a double-pole switch. The new device, which goes under the name of "U-re-lite," consists essentially of two circuit breakers, one on each side of the line, inclosed in a steel box. The switch is operated by first turning a handle on the outside of the box to the left, which closes one of the single-pole circuit breakers. Turning the handle to the right closes the other circuit breaker. It is so designed that after one breaker is closed it is free to respond and instantly open the circuit, should the other one be closed against an overload or short circuit. It is this construction which makes the knife switch unnecessary. After the circuit is established, when actuated by overload or when tripped by hand by means of a knob, both sides of the circuit are opened simultaneously. This type of switch is manufactured in ampere ratings of from 2 to 60 amp., for use on either alternating or direct current of voltages of 250 or less.

Oklahoma Utilities Hold Conventio

Utility Men of Oklahoma Optimistic—John W. Shart Oklahoma Railway, Says that Improperly Regulated Utilities Cannot Be Successfully Financed Nor Can They Give Adequate Service

THE most successful convention in the history the Oklahoma Utilities Association came to a cl on March 10 after a three days' session at Oklaho City, Okla. It was attended by more than 300 util operators and others interested. A spirit of optimi pervaded the convention in spite of the difficulties many members are having in financing new propert and improvements. Nevertheless, the spirit of Weste hospitality and enthusiasm prevailed. The public ficials who addressed the meeting included Gov. J. B. Robertson of Oklahoma; Campbell Russell, chairman the Oklahoma Corporation Commission; Paul Walk referee of the State Supreme Court and former att ney of the Corporation Commission, and H. W. Hub thal, chief telephone engineer of the commission. P P. Hayes, member of the Public Service Commissi of Indiana, made the principal address at the banqu on Monday night, March 9. Other speakers were Jo W. Shartel, vice-president and general manager of t Oklahoma Railway; J. W. Ingison, Ingison Hydro-El tric Power Company, Minneapolis, Minn.; H. B. Wrig H. B. Wright Investment Company, Kansas City; C. Griffith, Little Rock Railway & Light Company, Lit Rock, Ark.; William B. Way, secretary of the Natio Gas Association of America; James P. Barnes, Lou ville Railway, and C. L. Mitchell, Minnesota Elect Light & Power Company, Cushing, Okla.

Officers of the association elected for the ensuing ye are John W. Shartel, Oklahoma City, president; C. Devin, Apache, first vice-president; F. A. Willard, M Alester, second vice-president; William Mee, Oklaho City, treasurer, and H. A. Lane, Oklahoma City, ma ger. An executive board comprising fifteen membe was also chosen.

In an address, in response to a speech by Govern Robertson, Mr. Shartel declared that the utilities do object to regulation, but it should be intelligently ministered. He recommended a revision of the wh system of dealing with the utility question and p dicted that with a reorganized electric system adequate facilities the state would have an increa population of 750,000 within five years. Unless public wishes to furnish the capital to finance th utilities, private capital must have its recompense. P vate capital will not come in unless it has a prom of absolutely fair treatment. The great difficulty w the public utility situation is that the people have yet grasped these fundamentals.

Headway Recorder Supplies Traffic Data

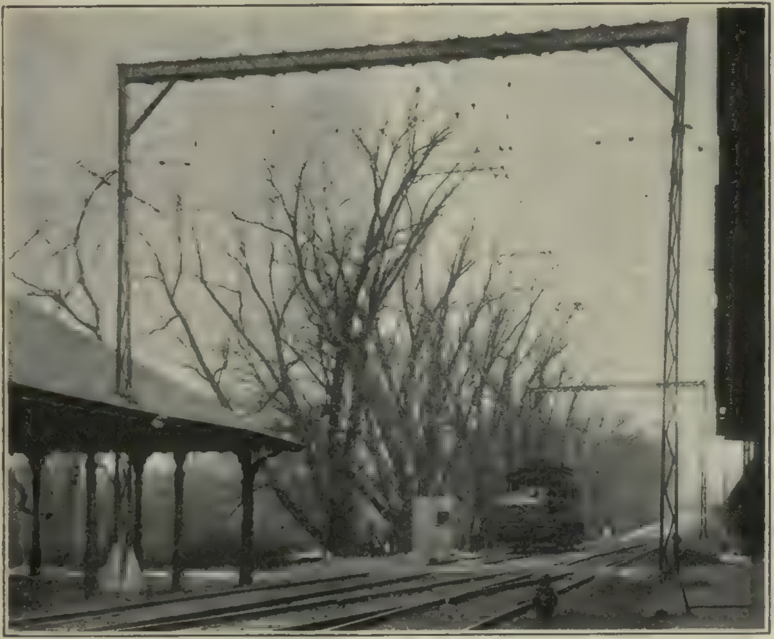
THE Youngstown Municipal Railway has installed Nachod type R-2 headway recorder on one of lines for the purpose of studying traffic and schedu conditions and securing data on interruptions to servi This device can be used either on single-track double-track lines, for as a car passes under the troll contractor, an impression is made on the chart whi shows the time the car passed and also its direction. is the plan to transfer the recorder from one line another so that the same study may be made on a line on the system.

Branch of St. Paul R. R. Electrified

Freight on Old Chicago-Evanston Branch of St. Paul Railroad Now Handled Electrically by the Northwestern Elevated Railroad —The Overhead Construction of This Electrification Is of Interesting but Special Design

THE Northwestern Elevated Railroad, Chicago, operates between Evanston and Wilson Avenue, Chicago, on right-of-way leased from the Chicago, Milwaukee & St. Paul Railway. This branch of the St. Paul was originally the Chicago & Lake Superior Railroad, but it was never extended any farther north than Evanston. Passenger service was discontinued on it some years ago, but the steam road has retained a track adjacent to the electrically operated elevated line for the purpose of giving freight service to a number of industries located along the right-of-way, consisting mainly of coal and building material dealers. When it became necessary to elevate the tracks of the Northwestern north of Wilson Avenue, in accord with a city ordinance, the work of necessity included the St. Paul Railroad and the industry spur tracks. With this freight service elevated, the presence of noisy and smoky steam locomotives in the high grade residential section was more than ever undesirable. Consequently, when a new contract was entered into between the elevated and the St. Paul Railroad, which provided facilities for extending service north from Wilson Avenue to the city limits at Howard Street, one of the terms written into the contract by the steam railroad was that this freight service should be handled by the Northwestern Elevated Railroad for the St. Paul at cost. Accordingly, the former company has electrified the track used in this freight service, and this track will now be used for freight service during the non-rush hours. During the rush hours the tracks will be used for elevated passenger trains only, thus enabling the operation of both local and express trains from the downtown loop to Howard Street, the city limits, in both directions.

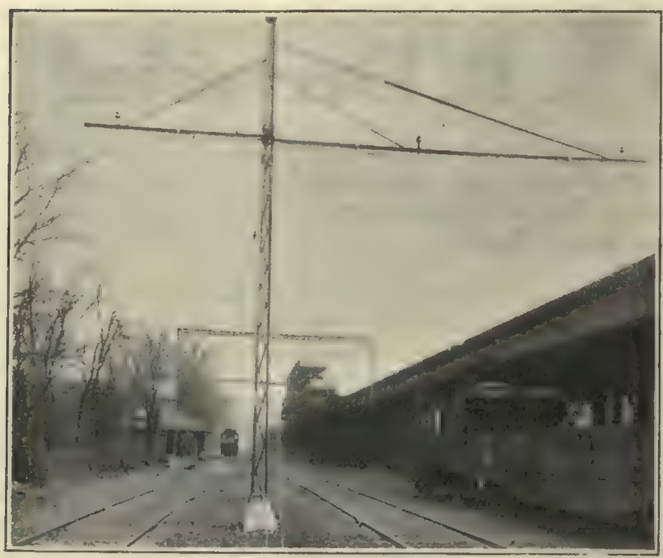
In handling this freight service for the steam road, the elevated company simply acts as the agent of the St. Paul, setting empty cars in the siding and hauling away loaded cars, or vice versa, and having nothing to do with the accounting, billing or any of the details aside from actual transportation. A monthly settlement is made on the basis of a fixed sum per loaded car moved, and the contract provides for the adjustment of this sum at stated intervals to take care of fluctuating costs.



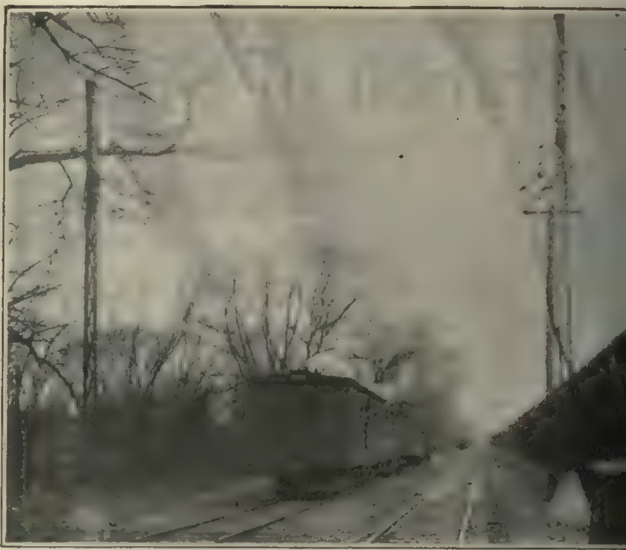
CATENARY OVERHEAD ON CHICAGO ELECTRIFICATION OF ST. PAUL R.R. BRANCH, SHOWING BRIDGE CONSTRUCTION WHERE GUYING WAS IMPOSSIBLE—APPROACH TO ELEVATED TRACK IN BACKGROUND

The steam road leaves the cars in a receiving yard located between Irving Park Avenue and Montrose Avenue and having a capacity for thirty loaded and thirty empty cars. This yard comprises three tracks, one of which is the main line and one the storage track for loaded cars and the other the storage track for empty cars. About fifty cars a day are handled. Cars are taken from and delivered to this yard by the two electric locomotives purchased by the Northwestern for the purpose. Immediately north of the yard the track ascends a 2 per cent grade onto the elevated structure. This freight track then extends north to Howard Avenue. From there to Evanston freight trains will be hauled over the two tracks of the elevated line. One of the most interesting parts of this electrification work was the construction of the overhead. At the present time, the elevated cars are operated between Wilson Avenue and Howard Avenue by means of the overhead trolley, but it is expected that this will be replaced with third rail, as used on the remainder of the system, at an early date. However, on account of clearances, it is impractical to employ a third rail on the track used in the freight service, so that it has been necessary to put up a permanent overhead construction for one track for the distance of 5 miles from Irving Park Boulevard to Howard Avenue. When this track is used during the rush hours in the passenger service it will be necessary to use the overhead trolley. As the cars operating on the Northwestern line must be equipped with trolley poles in order to operate north of Howard Avenue anyway, this will not bring in any new complication.

The overhead construction employed is of the catenary type supported on 6-in. top 35-ft. and 50-ft. Bates expanded steel poles and steel mast arms. The poles set in the ground are all set in concrete 5 ft. deep and spaced for 150-ft. spans. The mast arms sup-



STEEL POLE SUPPORTING OVERHEAD OVER THREE TRACKS, SHOWING CONCRETE FOOTING AND MAST-ARM CONSTRUCTION



METHOD OF DEAD-ENDING HEAVY OVERHEAD—END POLES ARE GUYED TO 2-TON CONCRETE BLOCK ANCHORS BURIED IN THE GROUND

porting the overhead are made up of two pieces of 2¼ x 2¼ x ¼-in. angle irons bolted together back to back with the pole and truss pins and spacing blocks in between the two angles. The messenger supporting the No. 0000 grooved trolley wire is of 7/16-in. Siemens-Martin steel cable. In the storage yard at Irving Park Boulevard it was necessary, on account of lack of space of guy poles adjacent to the "L" structure, to support the overhead over the three tracks on a single line of poles, necessitating the use of 24-ft. mast arms on one side. The overhead equipment was of Westinghouse and Drew manufacture.

Just north of the yard, on account of the long cross-span necessary to provide for three tracks, the heavy weight of the overhead special work at that point, and short guy space, a bridge construction between Bates steel poles was employed. This is shown in an accompanying picture. Over the incline leading up to the elevated track a double trolley was installed in order to provide more current-carrying capacity, for the two locomotives are sometimes coupled together to p heavy loads up this grade. In this case they may p as high as 2,000 amp. each for a period of five six minutes.

METHODS OF SETTING POLES

Several different methods of setting the steel po was necessary in providing for the different conditio existing along the elevated construction. On the pe manent elevation work, the poles were set on the t of the retaining wall or on the concrete curbing on sl construction, and in such setting a special footing w provided for the pole by bolting a piece of channel ir to either side of the pole, as shown in the accompanyi drawing. Additional strength at the base of the po was gained by filling with concrete up even with th top base support. The various methods of setting po are shown in the accompanying drawing.

An interesting special case of pole setting was th used along the approach to the elevated structure a

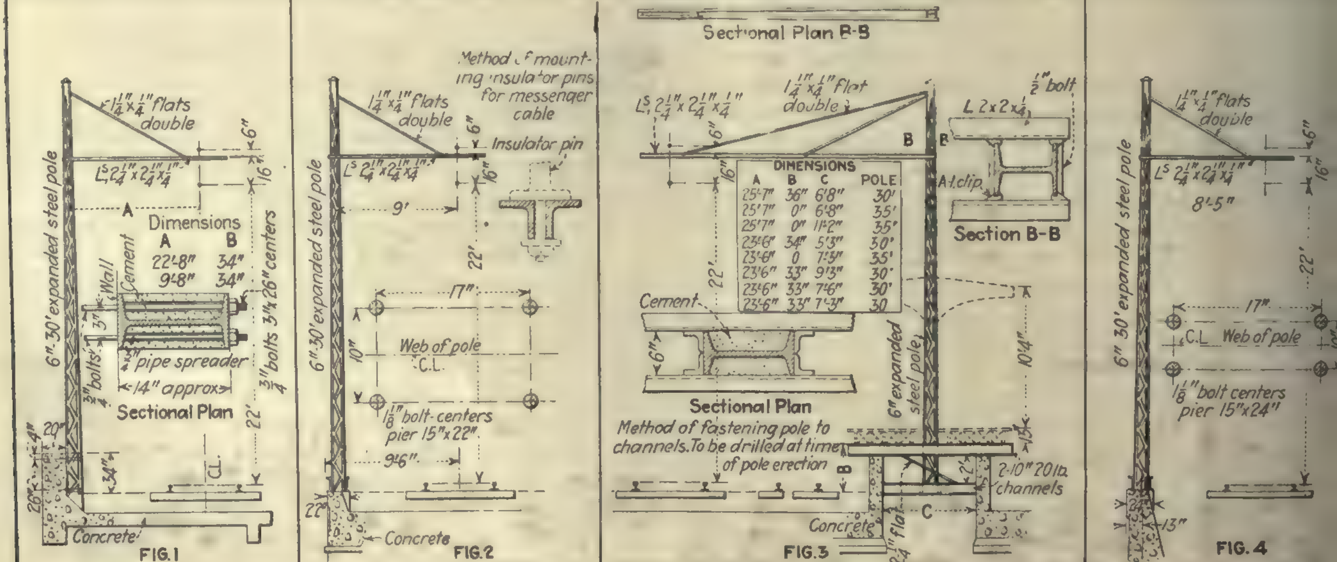


FIG. 1—METHOD OF SETTING STEEL TROLLEY POLES ON BRIDGES WHERE SIDE GIRDER EXTENDS ABOVE TRAC LEVEL. FIG. 2—METHOD OF MOUNTING POLES ON CURBING WHERE THERE IS A SLAB CONSTRUCTION. FIG. 3. —METHOD OF SETTING POLES IN CENTER OF STATION PLATFORM CONSTRUCTION. FIG. 4—METHOD OF SETTING POLE ON TOP OF CONCRETE RETAINING WALL FOR FILLED-IN EARTH ELEVATION

at certain other points. Here the poles were set in the ground adjacent to the concrete retaining wall, making necessary a 50-ft. pole. These 50-ft. poles were made up of three standard 25-ft. steel poles, two of which form the base, with the third as the upper part and supported by fastening to the top of the bottom sections. The two bottom poles were erected and riveted together side to side, with six rivets. The upper section was then held in place by means of two plates overlapping the top and bottom poles and riveted thereto with six rivets in each plate.

ELECTRIC LOCOMOTIVES USED

For the sake of standardization, the two 50-ton Westinghouse 600-volt direct-current locomotives purchased by the Northwestern for handling this freight service were equipped with the same size wheels, the same motors and the same gear ratio as that used on the latest type of steel cars purchased for passenger service on the elevated lines. Each locomotive is equipped with four Westinghouse 567-R-1 motors. The wheels are 34 in. in diameter and the gear ratio 17 to 60.

These motors are of the field control type, developing 165 hp. each on one-hour rating. The locomotives are arranged for multiple-unit control so that they may be coupled together for pulling a train as long as twenty-five cars up the 2 per cent grade approaching the elevated structure. They are equipped with Economy watt-hour meters. There are three running points provided in the control, providing three operating speeds. These are derived by connecting all four motors in series, two motors in series and two in parallel, and four motors in parallel. The motorman notches up the throttle-type controller through sixteen points to the full series position, then brings the controller back and throws a change-over lever which provides for the parallel running points.

ONE OF THE ELECTRIC LOCOMOTIVES USED BY NORTHWESTERN "L" TO HANDLE ST. PAUL R.R. FREIGHT

The brake equipment is of the Westinghouse 14 E. L. locomotive automatic type with air supplied by a Westinghouse Type D-3-F 35-ft. compressor designed for continuous duty. All equipment is mounted inside the cab. The trucks are of Baldwin Locomotive Company manufacture.

Pneumatic Wrenches Used for Tightening Track Bolts

IN SEVERAL recent operations of laying rail, the Lehigh Valley Railroad has used pneumatic wrenches for running up and tightening the track bolts. As this was its first attempt the organization worked out for the operation was somewhat of a makeshift character.

In one instance an air compressor was pushed along by hand and four pneumatic wrenches were attached to it by air hose. This arrangement covered two joints at one time. In another case, a motor car was attached to the compressor and but two wrenches were operated. The time for running up a joint and moving to the next averaged about thirty seconds per joint.

The men released by the machine were placed at work on the old rail preparing it for loading.

DOUBLE TROLLEY WAS INSTALLED OVER THE GRADE UP TO THE ELEVATED TRACK—SIMPLE SINGLE-TRACK POLE AND MAST-ARM CONSTRUCTION

METHOD OF ERECTING OVERHEAD POLES, MADE UP OF THREE LENGTHS RIVETED TOGETHER, BESIDE THE ELEVATED STRUCTURE

Two Live Topics Discussed

The Merchandising of Trolley Freight and Express Service and the Latest Facts Regarding the One-Ma Car Were Subjects of the Recent One-Day Conference of the New York Electric Railway Association's Quarterly Meeting, Which Was Held at the Biltmore in New York City on March 18

THE twenty-fourth quarterly meeting of the New York Electric Railway Association was held in New York City on March 18. A part of the conference was the subject of an article in the issue of this paper for March 26, page 601. There the paper by L. R. Brown, New York State Railways, was abstracted and the discussion which it provoked was summarized. Below are reports of the informal discussion of the freight and express business of electric railways and of the safety car.

Freight Department Has Great Opportunity to Help Increase Net Income

THE discussion on electric freight business was opened by T. H. Stoffel, railway department Westinghouse Electric & Manufacturing Company. He said that railway men do not generally realize the importance of intelligent and well-directed freight solicitation. While the securing of freight tonnage is properly the principal function of the traffic department, often this department is handicapped and subordinated to the operating or transportation department. It is relegated to the position of a clerical division, with activities largely confined to compiling tariffs, quoting rates, adjusting claims, etc. The head of the traffic department is entitled to rank with the chief transportation officer and should be vested with complete responsibility for the results of freight operation. He should have a voice in the arrangement of freight schedules, distribution of equipment, etc., and should enjoy the full co-operation of the transportation department. This is a plan of organization generally in effect on steam railroads, evolved from many years of experience.

The electric railway engaged in freight handling may be compared to the manufacturing plant, the transportation department being the manufacturing end and the traffic department the sales organization. No manufacturer would expect in normal times to dispose of his product without a sales force, and the electric railway needs a well-organized soliciting force, backed up by adequate rolling-stock and terminal facilities, together with strict maintenance of advertised schedules, in order to sell its one commodity, transportation service.

Mr. Stoffel outlined the desirable characteristics in the freight solicitor, who, he said, in addition to a thorough understanding of the classification, rates, routes, schedules, etc., requires considerable tact and knowledge of human nature, coupled with personality which inspires confidence. He will be called upon from time to time to solve many knotty transportation problems, smoothe over complaints, inspect damaged shipment, arrange payment of claims, and generally satisfy the needs of patrons. He must also educate shippers as to matters in connection with forwarding goods. The freight solicitor who can gain and hold a shipper's confidence and assist him in solving his problems will receive preference in the routing of shipments.

As the purchaser or consignee, as a general rule, pays the freight and controls the routing, Mr. Stoffel sai that it is very necessary that he be induced to includ a desired routing on his order for goods. This r quires personal effort, as the practice of securing rou ing requests on blanks provided for the purpose by th railway and filing them with the shipper does not in ge eral bring the desired result. It should be the freigh solicitor's duty fully to acquaint himself with the to nage moving to and from his territory at all times, an be able to anticipate shipments of seasonable goods fa enough in advance to make early solicitation and to hav routing by way of his line based on orders sent in. Th representative at the shipping point should also be ke fully informed. Local agents along the line can als assist in this work by transmitting to the traffic depar ment full particulars regarding shipping informatio which they pick up from time to time.

Among other ways mentioned by Mr. Stoffel in whic freight traffic can be developed were co-operation wit civic bodies interested in the advancement of the communities with a view to securing new industries fo the towns and locating them near electric railway line finding new markets for established industries, assisti industries in locating and securing raw materials, a even creating a fairly new industry for the territor As an example, through the traffic department of o electric railway, a tomato raising and canning indust was located along its lines, with the result that it e joyed an excellent business hauling tomatoes to th plant and from it to distributing centers.

In conclusion, Mr. Stoffel urged the importance using newspaper and other advertising, particular cards or folders containing maps and information as schedules, rates and service, which can be placed in th hands of traffic managers and shipping clerks. A live discussion followed these remarks.

DISCUSSION ON FREIGHT MATTERS

Speaking for the freight department of the Rochest & Syracuse Railroad, H. C. Stanton said that on th property solicitors are employed the year round. Th call at least twice a year at the intermediate statio and for the remainder of the time are at the termina Card records giving full data of calls are kept by t traffic department. Advertising is done by circul letters, cards in waiting rooms, etc. The freight bu ness, said Mr. Stanton, must stand on its own fe Business now needs to be gone after, as competition keen and shippers are watching rates. As interurb rates are high, good salesmanship is required. It important that every promise made be kept scrupulous At the suggestion of H. H. Norris, ELECTRIC RAILW JOURNAL, who spoke of the advertising value of attra tive freight terminals, Mr. Stanton described the n terminal at Rochester.

The necessity for getting new business was urged W. J. Harvie and W. J. Lee, Auburn & Syracuse Elect Railroad, who reinforced Mr. Stanton's statements as the importance of personal solicitation, say three to fi times a year, to advertise the superior quality of the service and thus to offset the effect of the slightly higher rates. Another speaker suggested applying to the traffic business the principles followed by the manufacturers in knowing more about their customers' business in some particulars than the customers themselves, and in studying the ways in which the customers can be served. Further, there must be co-operation between the freight solicitors and the operating management so that the former will know what kinds of business are profitable and should be sought.

T. R. Langan, Westinghouse Electric & Manufacturing Company, said that if the electric railway people were as enthusiastic as the truck salesmen, and believed in themselves as thoroughly, they would get better results. He suggested as timely questions those relating to the obstacles which are met in selling railway freight service and to the extent to which electric railway traffic men are co-operating in the freight business. Other questions relate to the places in which the freight business can best be developed.

TRUCK COMPETITION NOT SERIOUS

As to the matter of truck competition, Mr. Stoffel said that this is not as serious as some seem to think. The chief difficulty with truck operators is to get them to keep accurate accounts of expenses. Most of them are living on the depreciation of their trucks. Trucks cannot compete with electric railways on runs longer than 20 to 25 miles. Some industrial concerns or merchants make their own deliveries up to 30 miles, but they would not find this profitable if they allowed for overhead expense. A large number of truck operators in business two years ago have now given up. Mr. Stoffel expressed the belief that electric railway men make too much of the truck competition, which he did not consider permanent. In answer to a question from Mr. Harvie as to the desirability of reducing electric railway freight rates to compete with steam railroad and truck rates, Mr. Stoffel said that this should not be done. The same basis of rates as that used by the steam roads should be used. Trucks cannot operate at less than American Railway Express Company rates. The superiority of electric railway service with respect to the effect on the shipment should be made much of. For example, milk and live stock are delivered in much better condition and the service excels on perishable products.

A. J. Manson, also of the Westinghouse company, said that success in selling electric railway freight service is largely a matter of analysis of the sales possibilities on a particular property. Moreover, steam railroads are going to become more congested in the future and they will find local business less profitable to handle as time goes on.

H. C. Page, general manager Worcester (Mass.) Consolidated Street Railway, said that his company is doing considerable freight business, which is an excellent business to develop, because once a customer is secured, he seldom gives up the service. This service is quicker and more reliable; there is no reason for fearing motor truck competition, because the electric railways will get their legitimate business in the long run and the limit of economical radius for truck service is less than 20 miles. Truck operators are not as enthusiastic as they were. The trouble with the electric railways is to get the equipment to handle the business. Direct truck service between New York and Worcester was inaugurated some time ago, but has not proved successful. As an example of electric railway freight service, Mr. Page cited the motor and trailer night train operated between Boston and Springfield. His company furnishes a two-man crew between Worcester and Springfield. The business is profitable. Freight cars are dispatched carefully just like passenger cars and steam road rates are charged. In conclusion, he said that his company would not think of giving up its freight business.

The discussion on freight and express traffic was closed with a number of short suggestions. D. E. Crouse, Rochester & Syracuse Railroad, said that electric railways should take a hint from the manufacturers and furnish their freight solicitors with "kinks" which would make the service attractive. H. N. Ransom, Westinghouse Electric & Manufacturing Company, asked as to the use of containers moved on flat cars, but this point was not discussed. Frank Hickey, Rochester & Syracuse Electric Railroad, urged that motor trucks be put under public service commissions to force them to carry their share of the road maintenance cost, etc. Mr. Stoffel said that motor trucks are going to be suitably taxed. Already substantial annual and mileage taxes are being levied and this will help to solve the problem of competition. Chairman Cherry agreed that rates should not be lowered in competition with truck and steam railroad service. The whole thing sums up thus, he said: "Good service deserves good rates."

One-Man Car Operation

A DISCUSSION of the advantages and disadvantages of one-man car operation was taken up immediately after luncheon. R. E. McDougall, manager traction lines New York & Harlem Railroad, told of his experience in operating one-man cars on the Eighty-sixth Street crosstown line in New York. This operation was begun as an experiment last July with double-truck cars having folding doors and steps. The only change made for their use in one-man operation was to lock the back door.

The crosstown line is approximately 1½ miles long and this service is now taken care of by ten cars during the off-peak period, with fourteen to sixteen cars during the rush hours. The cars are 37 ft. long, weigh approximately 15 tons and seat thirty-six passengers. The operation has been successful and the operators have had no trouble in handling the passengers. A small Johnson fare box is used and this is carried from end to end by the operator whenever he changes his operating end. This line is carrying approximately 14,000 revenue passengers and receives 4,000 transfers per day. The service is taken care of by operating a 3.7-minute headway during off-peak periods and a two-minute headway during rush hours. The scheduled speed is 7.7 m.p.h. and the cars are operating approximately 1,300 miles per day.

A noteworthy result of this operation is that the earnings have increased approximately 85 cents per car-hour and from 9 to 11 cents per car-mile.

Mr. McDougall said that there had been no increase in accidents other than some due to vehicular traffic, and this he believes was accounted for by the present use of twenty-eight city buses that were not in operation the previous year, with which the present operation was compared. Later, in answer to a question as to how he accounted for the increase in earnings, Mr. McDougall said that he believed some of this was due to people changing from bus riding to riding in the cars, as there had been a falling off in passengers carried by the buses. The motormen operating these cars receive 5 cents per hour more than those operating two-man cars. No breaking-in period was used at the time of starting the operation. A notice was posted and verbal instructions given, but otherwise no additional instructions were given the motormen.

W. G. Gove, superintendent of equipment Brooklyn Rapid Transit Company, told of the experiences that his company has had in operating Birney safety cars during the past year. He said that no subject is of any more active interest at present than that of reducing platform expense and of realizing economies that result from safety-car service. The service in Brooklyn is quite varied. Operation of safety cars at the present time is over bridges which have a considerable length, and in suburban service where the stops per car-mile are comparatively infrequent. Also the cars are operated through a more-or-less congested district.

At the introduction of safety car operation, the service was given no particular publicity, and so far no serious trouble has been experienced from the riding public. The crews of these cars receive 5 cents per hour more than the regular rates, which are 57 cents to 67 cents per hour.

Mr. Gove said that at present the Brooklyn surface lines are operating approximately 2,000 cars daily and he believes that there is a field in Brooklyn for the operation of at least 1,000 safety cars at the present time.

DESIRE FOR LARGER CAR DISCUSSED

In regard to various criticisms which are being made of the Birney type of safety car, which would seem to indicate a desire for a larger and heavier car, Mr. Gove said the more quickly the operators divorce themselves from the experiences which they have had with other types of cars the better it will be for all concerned. The only excuse for adding more weight is to increase the strength, and while at present truck drivers in Brooklyn seem to feel that they can take somewhat more liberties with the light cars than they would attempt with the heavier ones, still Mr. Gove said that he had found that while accidents are more frequent the repairs can be more easily taken care of. The type of construction permits of the cars being put back into shape with less cost than would be the case with heavier type of construction. As a result of the one year's experience Mr. Gove felt that the maintenance cost which had been occasioned by accidents was not particularly high with the safety car.

At the present time the Brooklyn company is contemplating changing over 200 double-truck cars for one-man operation. These cars are provided with what is called a "one-third vestibule" and changes will have to be made in order to provide folding doors and steps. It is the intention to use all the standard safety devices in equipping these cars.

In answer to a question by J. K. Choate, vice-president J. G. White Management Corporation, Mr. Gove said that, comparing the probable life of the Birney car with the life of standard cars, he considered the life of the New York Municipal's subway car to be approximately thirty-three years and that of the safety car to be about twenty years. In regard to overmotoring safety cars to reduce maintenance cost, Mr. Gove said that he did not recommend this practice, but that care should be taken not to overload the motors by using safety cars to push snow out of the way. The experience in Brooklyn in the winter of 1919-1920 was somewhat discouraging during the first snowstorm, as due to lack of knowledge on the part of the transportation department quite a lot of safety car equipment was burned up. Profiting by this experience, the safety cars were run in as rapidly as possible during the late snowstorm and no attempt was made to operate them through snow.

CHICAGO CAR REFERRED TO

Mr. Choate referred to the opinions being voiced by some operating men that the single truck is a mistake for safety-car operation, as this type of truck rides badly over rough track in pavements and there is sure to be nosing on any track. Mr. Choate said that in Chicago they were now building a car for trial with maximum-traction trucks and of a slightly larger capacity. He felt, he said, that one-man cars have led to more overloading than has been experienced with any other type of car. He also said that he did not believe that the present light-weight cars would last twenty years and that a somewhat stronger construction was desirable. In reply Mr. Gove said that it does not necessarily follow that because a car is light its depreciation is rapid. As maintenance is probably the most vital factor, if a car was kept up in proper condition its life will be increased materially.

As to the use of a larger car, Mr. Gove said that he does not consider the safety car other than as a development of a unit; there is a wide field for the present type of car and just as wide a field for a double-truck car or a larger car. It would, however, be a serious mistake to have too many designs of safety car. No doubt improvements in car construction and equipment can be made in the present car, and these of course should be incorporated. In regard to brake rigging, he considers the present design safe and especially so when used with steel wheels as in Brooklyn.

In reply to a question as to the effect of over-motoring the cars and the desirability of doing this with any new equipment, A. J. Manson, Westinghouse Electric & Manufacturing Company, said that motors operating at 100 per cent of their full load rating would have a certain temperature rise. If the motors were operated at 80 per cent of their rating the temperature rise would be nearly as great, so that the life of the windings, which necessarily depend upon the temperature rise to which they are subjected, would not be materially longer. He said, however, that under overloading the conditions were somewhat different, as if the equipment was operated at 110 per cent of the full load rating the overheating would no doubt do considerable damage.

D. W. Burley, superintendent of transportation Binghamton Railways, said that his company had converted some cars for one-man operation. These cars have a seating capacity of twenty-eight and carry loads of considerably over a hundred during rush hours. These cars are used in service with regular two-man cars and their introduction has not slowed up operation in any respect. The trucks have a long wheelbase and ride very easily. Originally iron wheels were used, but the railway is now changing to steel wheels and finds these much better as there is less chipping of flanges.

In reply to a question as to experience of railways operating over railroad crossings and the precau-ions that are necessary, Charles Brooks of the Pough-eepsie & Wappingers Falls Railway said that this ompany's cars operate over two such crossings. The rocedure is for the operator to stop his car and go the crossing so as to make certain that no train vas approaching, then return to the car and cross as oon as possible. A trolley guard is used over such ailroad crossings.

F. A. Stratton, president Peekskill Lighting & Rail-oad Company, said that the light cars save power as vell as platform expense, but that his experience howed them not to be adapted to snow conditions. A -cent fare is in force in Peekskill and the cars carry arge loads over very severe grades. They keep up to chedule and operate well.

H. C. Page, general manager Worcester Consolidated treet Railway, said that ten Birney-type safety cars nd one converted one-man car are operating in Worces-er and that the operators seem to like the converted ype even better than the Birney. The car has a large tanding capacity, due to its longitudinal seating ar-angement, and it is earning about 10 cents per car-mile nore than the standard Birney car.

Hazard of Faulty Switchboard Construction*

ertain Factors Must Be Considered if Switching Apparatus in the Modern Power Plant Is to Be Installed with Due Regard to the Safety Feature

By Roscoe M. Bert

Electrical Superintendent Rockford Electric Company,
Rockford, Ill.

THERE are many power plants in operation all over the country, with switchboards for 2,300 and ,000-volt systems, which are entirely inadequate prop-rly to perform the true function of a switchboard in mergency. There is now available considerable infor-nation as to what makes possible a reasonably safe witchboard under all conditions of short-circuited ables and busbars. To obtain proper safety the fol-owing points must be carefully considered: (1) Ulti-nate capacity of generators installed. (2) Reactance f generators when all are operated in parallel. (3) Proper location of external reactance to limit short-ircuit currents. (4) Selection of an oil switch which vill rupture the circuit under the worst possible con-itions. (5) Proper arrangement of the apparatus to educe life and fire hazards.

In many cases the point has been overlooked that any witch connected to a main busbar should have ruptur-ng capacity equal to the total short-circuited capacity f all generators in operation, or at least should be rotected by reactors to within the limit of the ruptur-ng capacity of the switch, and, of course, protected by ependable relays.

In the past few years many stations of comparatively mall capacity have made additions of large turbine enerators and connected them to the existing switch quipment, and in many cases have "gotten by" with no erious results, but in others serious fires and accidents ave occurred. As long as service is satisfactory and ntil an accident occurs we do not realize the dangers hat exist. Recently this was very forcibly brought to my attention at a property in Indiana. In this instance an oil switch short circuited and blew up, killing two men and destroying by fire half the bus structure, a quantity of cable and damaging several motor-generator sets. Property damages amounted to approximately $20,000. Had the repair man and operator realized the danger and had sufficient apprehension as to possible results, the loss of life and most of the property damage could have been avoided.

As a result of this accident our engineers have decided completely to rebuild the switching equipment of the Rockford property and all others which are in an unsafe condition. All switches and busbars will be placed out of doors, using weatherproof apparatus completely. This has been done for some years for high-voltage equipment for 13,000 volts and above, so why not for 2,300 and 4,000-volt systems? The details of this scheme have not been fully worked out, but we have consulted manufacturers' engineers and they think it feasible.

Frequently switchrooms are partitioned off from all other parts of the power house, and are seldom seen by the operators. I would advise that openings be provided if possible that any incipient fire could be promptly seen by the station men. These openings should serve a further purpose, that is to allow men to escape in case a fire starts while they are working on the apparatus in these compartments.

Operators should be cautioned regarding accuracy in synchronizing of generators, as this is very severe service on switches unless done accurately. To improve this accuracy, I would recommend the use of a synchroscope with a very large dial and the cautioning of station men to take plenty of time in putting machines on the lines.

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*Abstract of paper presented before the Illinois Electric Rail-ay Association in Chicago, March 16, 1921.

Bulletin on Employment of Women as Conductors

THE success of the employment of women street car conductors or ticket agents in Boston, Chicago, Detroit and Kansas City is described in a bulletin just issued by the Women's Bureau of the United States Department of Labor.

Conditions for street car conductors were not ideal, according to this report, but no reason was found to prove that the work of a street car conductor was not fit for women. Neither the history of the employment of women on street cars nor the many disputes which arose over their employment were sufficient reasons for the final decision of the men's union that street car conductor's work was "unfit for women."

The discharge of many women ticket agents as well as conductors of the street railways of New York City in 1919 was the reason for the making of this study, as the Department of Labor did not consider these companies justified in the claims that they could not employ women and adhere to laws which had been passed regulating their hours of work. In conclusion the report states, "records from Chicago and Boston show that with the eight-hour day and six-day week, without night work, and with a wage far superior to that paid women in many other occupations, the woman ticket agent and collector is an accepted and permanent fact in two large cities. The fact that these conditions are far better than those prescribed by law in the same communities shows that some other contributory factor must be present when women are dismissed from this work because of the requirement for them of reasonable hours of work."

Electric Locomotives for the Austrian State Railways

Four Types of 15,000-Volt, Single-Phase Locomotives Have Been Designed to Meet the Various Conditions of Traffic Requirements, Topography and Track Limitations

By Arthur Palme

THE reasons which prompted the Austrian State Railways long before the war to electrify its roads hold true in a far greater measure for the new republic of Austria. The former Austrian monarchy was rich in coal, so that electrification of its railways was based almost exclusively upon the relative cost comparison between steam and electric traction. Today, as the republic can supply only 16 per cent of its coal requirements, it is under the necessity of electrifying all of its roads, thereby to maintain its railroad traffic and industries more nearly regardless of the high price of imported coal and the irregularity of its supply.

In the bill passed in July, 1920, the electrification of 40 per cent of all the main roads of the republic was specified. The lines included in this bill were enumerated in an article in the March 5 issue of the ELECTRIC RAILWAY JOURNAL by E. C. Zehme. Work has already begun on one of the most important of these lines, the Arlberg line from Innsbruck to the Swiss frontier near Bregenz.

Austria shares fully the general middle European railroad dilemma; that is, the doubt as to the most favorable system to adopt. Extensive studies of a general character and of the specially required best solution, however, led finally to the selection of the alternating-current, single-phase system with the low frequency of 16⅔ cycles per second at an overhead wire tension of 15,000 volts. The possibility of using three-phase current was not seriously considered on account of the much higher investment cost. One of the main reasons why high-voltage direct current has been eliminated is the lack of European experience with this system, and the necessity for extensive developmental and experimental work on the part of the Austrian and German electrical concerns in connection with this system, whereas all details for the alternating-current system had been developed and well tried.

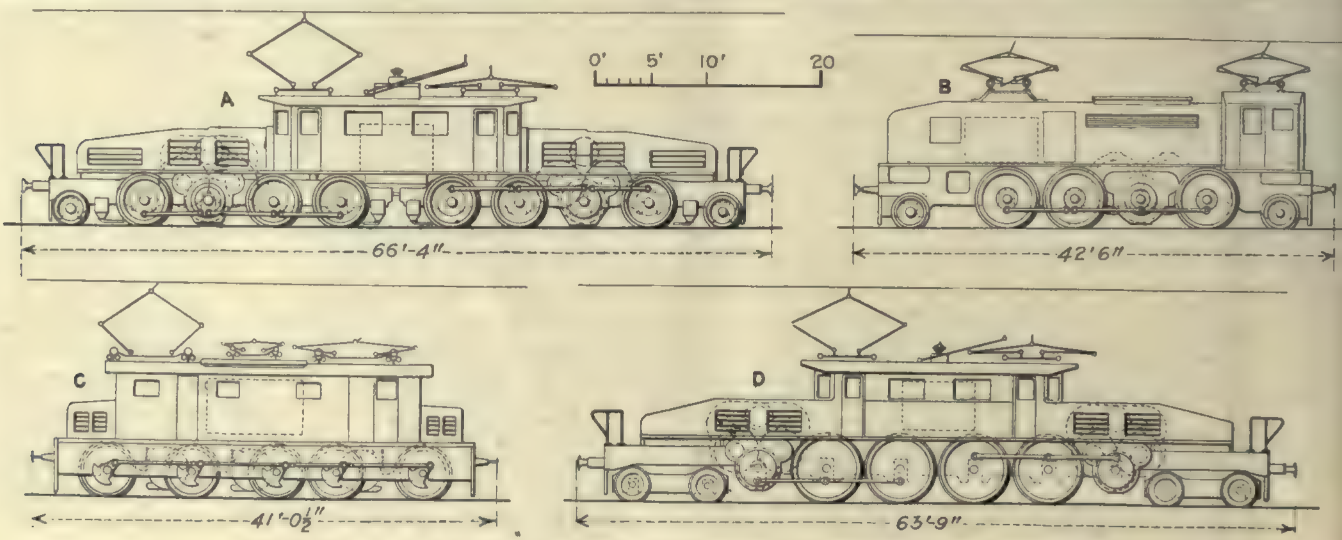
The topographical character of the planned lines is diversified. While there are typical mountain stretches with grades as steep as 3.14 per cent and unfavorable right-of-way, there are also long stretches of down grades so straight that speeds up to nearly 60 m.p.h. are being reached now with steam locomotives. In addition, very different traffic requirements exist on the various lines. For that reason four types of electric locomotives have been ordered to take care efficiently of the different kinds of service required by fast and slow passenger traffic and freight service. In order not to overload the present rails and some of the old bridges a limit of 16 tons axle pressure and a locomotive weight of not exceeding 2.3 tons per foot of over-all length have been established. All locomotives are built safely to round a curve of 500 ft. minimum radius. They will all be equipped with alternating-current series commutator motors, operating on a voltage reduced from 15,000 to 400-1,300 volts, transmitting their power to the drivers directly by gears or by gears through a jackshaft to coupling rods. All locomotives will have the automatic vacuum braking system, customary in Austria.

The following types of engines have been standardized and ordered:

DATA ON LOCOMOTIVES FOR AUSTRIAN STATE RAILWAYS

Type	Weight, Tons	Length, Ft.	Horsepower Contin-uous	Horsepower One-Hour Rating	Dia. of Drivers, In.	Gear Ratio	Motor Voltage	Transformer Rating, Kva.	Transformer Voltage	Capacity
1C + C1	127.5	66.3	2,000	2,460	53	1:3.2	575	2,000	15,000/1,240	396 tons at 31 m.p.h. on 2.64% grade 330 tons at 28 m.p.h. on 3.14% grade Maximum speed—40 m.p.h.
1C1	76	42.5	780	1,100	63.5	1:4.0	520	800	15,000/1,050	330 tons at 25 m.p.h. on 1.4% grade 220 tons at 21.5 m.p.h. on 2.5% grade Maximum speed—40 m.p.h.
E	80	41.0	.....	.....	57	1:6.3	...	850	15,000/440	1,100 tons at 18.5 m.p.h. on 0.8% grade Maximum speed—31 m.p.h.
2BB2	108	63.7	....*	.....	....	.....	..*	....*	15,000/*	495 tons at 18.5 m.p.h. on 1.5% grade 638 tons at 25 m.p.h. on 1.0% grade 715 tons at 50 m.p.h. on level Maximum speed—62 m.p.h.

* Electrical data not yet fully determined.



SIMPLIFIED ELEVATIONS OF THE FOUR TYPES OF AUSTRIAN LOCOMOTIVES

1. Express locomotive for mountain passenger service, class 1C + C1.
2. Passenger and freight locomotive for medium mountain road service and light freight, class 1B1.
3. Heavy freight traffic locomotive for level and mountain roads, class E.
4. Heavy express passenger locomotive for level and medium mountain service, class 2BB2.

The principal characteristics and outstanding features of these locomotives are shown in the accompanying table and illustrations. In general the same characteristic type of construction prevails, that is side rods driven from a jackshaft to which the motors are geared. However, the mountain freight type of locomotive differs from the other three designs in the detail that the motors are geared directly to the wheels, while all five axles are rods coupled. The 1C + C1 type will be used for pulling through trains over the steep grades of the Arlberg road.

In order to permit starting of electric operation before all roads are completely electrified, a number of battery-car trains are being built, each consisting of the battery car in the middle of the train and two passenger cars on each end. Two of the passenger coaches are trailers and two are motor cars which have a total motor output of 190 hp. at a normal speed of 22 m.p.h.

The batteries to be used weigh 20 tons and have a capacity of 222 amp.-hr. at 520 volts. The capacity of such a train, which is for auxiliary purposes and short distance only, will be 176 seated and 130 standing passengers.

Wisconsin Association Meets

Safety Car Operation and Construction, Street Railway Rates and the Use of Weekly Passes Are the Main Topics Discussed by Railway Members

IN JOINT meeting with the Wisconsin Gas Association, the Wisconsin Electrical Association met in its thirteenth annual convention on the afternoon of March 23. This session of the association was presided over by William C. Lounsbury, Superior, Wis., president of the electrical association, and it was occupied with broad utility matters. The meeting was addressed by Charles B. Scott, member of the national safety committee of the National Electric Light Association and general manager Bureau of Safety, Chicago, on some of the hazards of the electrical business and how to guard against them. A report on the work of the Wisconsin Public Utilities Bureau, organized during the past year for the purpose of spreading information about the public utilities to the public, was made by Frantz Herwig, director. R. V. Prather, secretary of the gas, electric and electric railway associations of Illinois and of the Great Lakes Division of N. E. L. A., read a paper setting forth in very able manner the various aspects of the need for associations of public utility companies, the purposes of such organizations and the obligations of the companies to them.

A banquet at the Pfister Hotel on the evening of March 23 concluded the joint convention. N. J. Whelan acted as toastmaster of this function and Edgar A. Guest was the speaker of the evening. A good deal of entertainment was afforded to the members by the distribution of several articles as gifts to different members of the association.

The Wisconsin Electrical Association held a separate meeting on March 24, at which time the president's annual address was read and various committees made their reports. Speaking of the railway situation, President Lounsbury said: "The street railway situation is not nearly as discouraging as it has been for the past few years. In many places it is indeed dark. The truck, the pleasure car and the former rapid expansion of lines increasing the long haul, together with the extremely high operating expenses, have been disastrous in their consequences, but from the confusion comes a realization of the importance of the street car and a better public appreciation of its worth to the community."

For the steam road crossing committee, C. R. Phenicie, Wisconsin Public Service Company, reported that the Wisconsin Railroad Commission had done an extensive work in classifying all crossings and tabulating them with the clearance, grade, angle, protective devices used, etc., all of which was considered to be of little value to the electric railway. He said that an effort had been made to co-operate with the steam railway officials who had this matter up before the commission, but the latter had refused to co-operate. The committee advised the association to recommend to the commission that a whistle post be installed on the approach of all steam line crossings with electric railways, and that trains be required to slow down to 25 miles per hour for the crossing. In discussing this report, which was adopted by the association, Dudley Montgomery brought out that it is the practice on his property in Madison, Wis., for the motorman to flag his own car in all cases, two-man as well as one-man cars. He does this by getting off his car and running across the tracks to make observation.

Several brief papers on one-man car operation were then read by Messrs. Arnold, Howard, Montgomery and Phenicie. Some of these appear in abstract in this issue and the others will be published later. In the discussion which followed, Mr. Montgomery took issue with the question raised by one of the speakers as to the use of the name "safety" in connection with the small one-man car. He said that the car had well earned its name, for the number of accidents had been very greatly reduced as compared with any other type of car. He said also that many companies had always wanted to use one-man operation but were not able to do so until the safety devices were invented.

H. A. Mullett, Milwaukee, spoke briefly of the use of safety cars in Racine and Kenosha, Wis. He pointed out that the design of these cars had included double flooring, side sheathing and head lining, steel wheels instead of cast, hot-air heaters instead of electric, and spring-cushion seats. He said that the standard width door, 30 in., had been used thus far, but the company had some feeling that a wider door would be better. He spoke also of the present consideration given to the air system to prevent freezing, and said that not a single case had developed during the past winter. Since the installation of safety cars in these two cities, there has been such a falling off in the general business handled by the company, that Mr. Mullett said it was impossible to make any comparison as to the savings, increase in business developed by the more frequent headway, etc.

He spoke of the weekly pass which has been in use in Racine for two years and was recently adopted in Kenosha as well. The principal advantage claimed for this unlimited pass is that it promotes the habit of riding and encourages riding, particularly during the off season. During the winter of 1920 the company sold about 2,000 passes per week, the revenue from which amounted to about 15 per cent of the total. During the summer, when the amount of traffic always falls off in Racine, the number of passes sold averaged about 1,300 per week, which accounts for 10 or 11 per cent of the total revenue. For the first three months of this year 2,200 passes per week have been sold, approximately 20 per cent of the total revenue coming from this source. Mr. Mullett said that these passes are very popular in Racine. They are sold for 98 cents to the trainmen, who distribute them to the riders for $1 each. He said it has been impossible to determine definitely how much increase in riding has been fostered by the use of these passes, but mentioned the fact that many downtown restaurants had protested because a good many of their customers were now going home to lunch.

W. H. Sawyer, president East St. Louis & Suburban Railway, made a plea for companies to hold to the standard design of safety car, because of the many advantages accruing from the reality of standardization. He ridiculed the contention of "local conditions" often used to support an argument for a different design.

Mr. Sawyer then presented a paper on street railway tariffs, in which he reviewed the study and findings of the committee on fares of the American Electric Railway Association and gave the result of some recent investigation on his part as to the results obtained from the inauguration of 10-cent fares in various cities. His principal conclusion was that higher fares do produce increased revenue, and that where the rate of fare must be above 5 cents, a 10-cent cash fare with reduced ticket rates is the best form of tariff. His paper will appear in abstract in a later issue.

The following officers were elected to conduct the affairs of the association for the ensuing year:

President, J. P. Pulliam, vice-president in charge of operation Wisconsin Public Service Company, Milwaukee, Wis.; first vice-president, Harold L. Geisse, Milwaukee; second vice-president, P. D. Kline, vice-president Wisconsin-Minnesota Light & Power Company, Eau Claire, Wis.; third vice-president, Harry R. Ellis, vice-president and general manager Eastern Wisconsin Electric Company, Sheboygan, Wis., and secretary, W. M. Chester, 1408 First National Bank Building, Milwaukee, Wis., assistant to Mr. Pulliam in the Wisconsin Public Service Company.

Why Not the One-Man Car?

By B. W. Arnold

Manager Eastern Wisconsin Electric Company, Oshkosh, Wis.

THE name "safety car" as applied to this new type of car operated by one man I feel is an error, because there is no such thing as a safety car any more than there is a safety shot gun or safety revolver. Either is safe if properly handled, but neither is safe if improperly handled. Accidents will always continue to occur as long as they are in use. Can you imagine the feeling of some poor chap who has been unfortunate enough to be struck by a car and knocked to the side of the road and, while lying there waiting for the ambulance, he sees in large letters on the front of the car the words, "safety car"?

I am heartily in accord with the different safety devices which have been installed on this new car. The feature of the emergency action from letting go of the controller handle and the handling of doors and steps by engineering valve are both a distinct development in the art of car control and of great benefit in preventing accidents. But to operate all of these safety devices we again revert to the human element, and that, as we all know, is subject to failure as are mechanical devices. I therefore see no need of any departure from the old honored name of "street car" when this new car is placed in operation in any community.

Some opposition has been encountered in some parts of the country to the operation of street cars with one man, but I feel this is simply another problem for the local management to work out and sell to the public. With the fine results obtained in so many cities, this should not be such a hard problem at this time.

That the light-weight car operated by one man has passed the experimental stage and is here to stay cannot be doubted, as the large number of these cars in operation and on order proves that the public is for them. I have always felt that a motorman and conductor on cars operating in cities up to 100,000 population, except perhaps on some heavily traveled lines, is an economic waste. When the motorman is at work the conductor is idle, and when the conductor is at work the motorman, to use the expression of the South, is "just standin' 'round." The new car eliminates this loss.

The proper method of flagging steam railroad crossings is a matter to be worked out by local managers with the aid and advice of the railroad commission engineers. On our property we require the operator to bring the car to a stop at a sufficient distance from the crossing to insure gate clearance. He then leaves the car and goes to the center of the crossing for observation before proceeding. By this method he not only flags the crossing with his eyes but with his ears as well. By requiring him to leave the car one makes certain that he will stop for the crossing

APPLY SALESMANSHIP TO CAR RIDES AS WELL AS TO POWER

Mr. Street Railway Manager, you have something to sell, namely, rides on your cars. At Christmas time, when you are booming the sale of electric washing machines, irons, open gas grates, etc., your new business department has beautiful ribbons and holly tied on them. But you totally forget to put any of that holly or ribbon in your street cars when they start

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*Abstract of paper presented before Wisconsin Electrical Association, March 24, 1921.

out to bring in more nickels than the profit from the sale of all the appliances for the entire month.

Give the street railway an equal chance with the remainder of your business. Provide careful, courteous operators for your cars; have them clean and on time, all the time, not some of the time. In other words, sell your service to the people in such a way that they will want to buy it, and with the savings possible by the new type of car the figures on your balance sheet will be more pleasing at the end of the month.

One-Man Operation Is Very Desirable*

By R. M. Howard

Vice-President Wisconsin Railway, Light & Power Company, Winona, Minn.

MOST of the discussions we hear revolve around the light-weight single-truck car equipped with safety devices, and the tendency has perhaps been along the line of unduly emphasizing the importance of the car rather than the principle of one-man operation. Possibly it has been necessary to do this in order to establish one-man operation, and if so, perhaps we have been poor salesmen in selling the one-man operation idea to the public.

The primary idea of one-man operation is to keep the total cost down to the point where we can sell a ride to the public at a price that will encourage the use of our facilities. If we can only put this idea over to the public and secure the full co-operation of the public, one-man operation will need no defense, and it will become the standard everywhere except in zones of heavy traffic.

As I view one-man operation, the only valid objections that can be made by the public refer to time required to make change and slightly longer time required for loading at heavy traffic points. The odd penny fare complicates change making, and possibly a cash fare for transient and occasional rides sufficiently higher than the regular ticket rate to encourage the use of tickets by say 80 per cent of the riders may be the solution of the fare question.

The delay at loading points is very slight; it seldom has any effect on the schedules, and if the riders can be brought to the realization that the slight inconveniences mentioned insure the maintenance of a lower fare than is possible with two-man operation, it will not matter whether single or double truck cars are used.

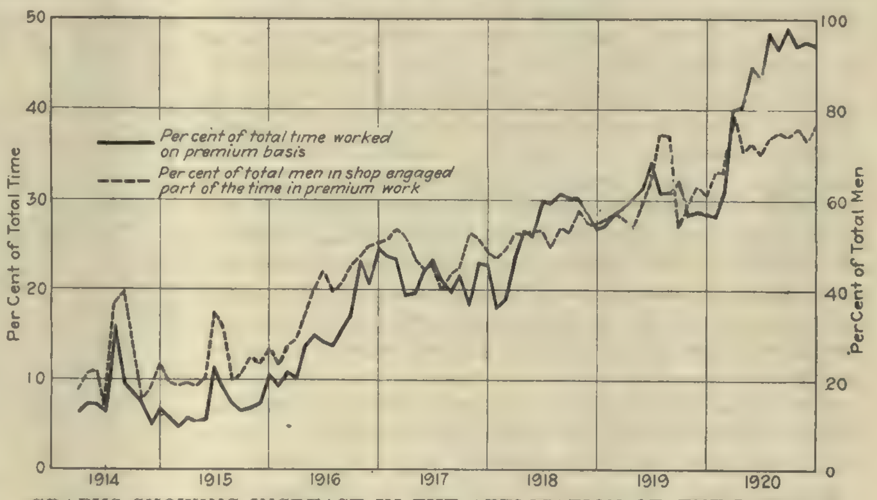
I believe the time is past due for the inauguration of one-man operation on many lines using double-truck cars. We are all suffering from a heavy reduction in earnings. We are carrying a heavier platform wage scale than was ever contemplated when our industry was developed. We are passing through what is politely called an adjustment period. The best adjustment we can make is along the lines of greatly extended use of one-man operation with such cars as our financial situation permits.

I do not want to convey the impression that we are opposed to safety cars, as the reverse is true, and our last purchase was standard safety cars which are operating very satisfactorily.

If the present depression continues we will have to follow the downward curve of earnings with a corresponding drop in operating expenses, and inability to finance or the time required to secure new cars if money is available for their purchase may compel the use of existing equipment with one-man operation.

Results of Premium Wage Plan

IN THE article by J. H. Lucas describing the premium wage plan used in the Milwaukee Electric Railway & Light Company's shop, which was published in the ELECTRIC RAILWAY JOURNAL for March 19, page 529, reference was made to the percentages of the total force engaged on premium work and to the percentage of man-hours time for work done. The accompanying graphs which were omitted from the previous article served to give a picture of present conditions and the increase that has been made since 1914. At the present time 76 per cent of the working force is engaged part of the time on premium work and nearly 50 per cent of all the man-hours time in the shop is for work done against standard time allowances and in a standard manner. The figures taken for arriving at these percentages of working forces and hours are total figures, which include the supervisory time as well as the time of the productive workers. These graphs also show that, due to the necessity for preparatory observations in establishing standard times for the various operations, the extension of the premium system must be gradual and somewhat slow at first.



GRAPHS SHOWING INCREASE IN THE APPLICATION OF THE PREMIUM SYSTEM TO SHOP WORK IN MILWAUKEE

New International Association Formed

THE organization of the new international association of street and interurban railways, mentioned on page 228 of the issue of this paper for Jan. 29, has been completed. The countries included are those in Central Europe. The president is L. Spängler, director of the Municipal Railway in Vienna, and the vice-president is Dr. Wussow, general manager of the Berlin Street Railway System. The members of the executive committee are: J. F. S. Barth, Christiania, Norway; W. von Châtel, Budapest, Hungary; E. Hultman, Malmö, Sweden; Paul Libowitzky, Oderberg, Czechoslovakia; Kai Norregaard, Copenhagen, Denmark, and T. E. van Putten, Amsterdam, Holland. The secretary is Dr. A. Ertel of Vienna.

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*Abstract of paper presented before Wisconsin Electrical Association, March 24, 1921.

Association News

Equipment Committee Holds Busy Session

A TWO-DAY meeting of the equipment committee of the Engineering Association was held at association headquarters on March 23 and 24. The first day of the meeting was taken up with a discussion of the various subjects by sub-committees and the second day with general reports and discussions before the entire committee. Those present were: Daniel Durie, West Penn Railways, chairman; W. S. Adams, the J. G. Brill Company; H. A. Benedict, Public Service Railway of New Jersey; R. H. Dalgleish, Capital Traction Company; James C. C. Holding, Midvale Steel & Ordnance Company; T. R. Langan, Westinghouse Electric & Manufacturing Company; F. H. Miller, Louisville Railway; C. N. Pettinger, Steubenville, East Liverpool & Beaver Valley Traction Company; E. D. Priest, General Electric Company; C. F. W. Rys, Carnegie Steel Company; C. F. Scott, General Electric Company; Karl A. Simmon, Westinghouse Electric & Manufacturing Company, and C. W. Squier, ELECTRIC RAILWAY JOURNAL. In addition to the regular members of the equipment committee, representatives of various manufacturers were present at the invitation of the committee to assist in developing standards for steel wheels, cast-iron wheels and gearing.

The work of revising the association standards for tread and flange contours for steel wheels and preparing a standard wheel contour for cast-iron wheels received considerable attention. This work is progressing very satisfactorily.

The American Gear Manufacturers' Association has drawn up a specification for gearing which is nearly the same as the present standard employed by the association and it is thought that the two specifications can be harmonized without undue difficulty.

In connection with the study of helical gearing which the committee is making, engineers from the General Electric Company presented an interesting demonstration with full-sized models to illustrate the effect of various degrees of helix angle and varying width of face. Representatives of the Westinghouse Electric & Manufacturing Company and of the R. D. Nuttall Company were also present and gave the committee the benefit of their experience in connection with the use of helical gears.

The sub-committee appointed to study the life of wearing parts and to report on shop practices relating to improving wearing qualities of parts is to obtain information from a large number of properties through personal observations made by members of the equipment committee. In order that the type of information obtained may be uniform, a questionnaire was outlined for the use of members only. It seemed probable that a reel or two of motion picture films could be arranged for presentation at the convention to illustrate the best manner of carrying out certain operations that would be of benefit in providing longer life and the chairman of this sub-committee is to obtain opinions regarding practices that appear desirable to have illustrated.

The sub-committee which is studying the present status of direct-current lightning arresters has formulated a questionnaire which will be sent out to all member companies to obtain additional information regarding this subject.

In connection with the design of a typical shop building, decisions were reached as to the number of departments and their relative size that should be accommodated and also various details of construction for convenience, safety and efficient handling of work. Studies have been made of about twenty-five shops and much valuable information is being tabulated. This sub-committee is working in conjunction with the committee on building and structures.

Work of Advertising Section Ready for Distribution

THE Advertising Section of the Division of Information and Service, American Association, has prepared for distribution various pieces of advertising material which member companies may obtain upon application.

The findings and recommendations of the Federal Electric Railways Commission have been epitomized and prepared for distribution in three different forms. There are two cards printed on stiff cardboard, one for wall display, containing briefly the findings and recommendations of the commission, and another a small card for desk use, containing the recommendations only. These cards will be supplied free in any amount to companies desiring them.

A series of fourteen suggested car signs have been prepared in miniature form and may be had free of charge upon application.

Six suggested newspaper advertisements presenting various phases of the Federal Electric Railways Commission report and other material of publicity value to electric railways are in readiness for free distribution upon application.

Two leaflets, "How to Keep the Hired Help on the Job" and "Right Over the Plate," also are ready for distribution. The first of these contains a series of seven constructive suggestions by Paul P. Haynes, a member of the Indiana Public Service Commission, that are of great publicity value. The other leaflet, "Right Over the Plate," is devoted to President Harding's views on the electric railway situation. The outside of the leaflet carries a reproduction of a picture of the President in the attitude of pitching a baseball, which, linked with the title of the leaflet, makes a very attractive and effective cover design. Both of these leaflets are being sold at cost, which ranges from $2.50 to $3 a thousand, depending upon the quantities on order whenever it is deemed advisable to go to press. Approximately three-quarters of a million of these two leaflets have already been ordered. The Advertising Section also has available a summary of all references to electric railway affairs which the various state Governors made in their inaugural or initial messages to their Legislatures this year.

In addition to supplying copy and making suggestions for copy to companies, the Advertising Section is very glad to give suggestions or advice in specific cases when it is desired. Companies that are planning an advertising campaign or are preparing advertising literature can have it reviewed by the Advertising Section upon request.

Accident and Claims Statistics Discussed

ON MARCH 30 the committee on claims statistics met at association headquarters. It was brought out that since last July nearly 150 requests for information on accidents have been answered by the bureau of information. The statistics collected by the committee last year had been the means used to answer these inquiries. In view of the completeness of this data, it was believed that the expense involved in duplicating the information by a further request at this time was unwarranted.

Those present at the meeting were C. F. Briggs, Public Service Railway, chairman; W. F. Weh, Cleveland Railway, and J. S. Kubu, New York State Railways. J. W. Welsh, acting secretary of the association, was also present.

T. & T. Executive Committee Hears Progress Reports

ON MARCH 25 the Transportation & Traffic Association's executive committee held a meeting to hear reports on how the work of the various committees was progressing. It is planned to have all reports in by July 15 so that they can be printed and distributed well in advance of the convention.

Those present in addition to President R. P. Stevens were L. H. Palmer, United Railways & Electric Company of Baltimore; G. T. Seely, Pennsylvania-Ohio Electric Company; J. K. Punderford, the Connecticut Company; T. C. Cherry, Rochester & Syracuse Railroad; J. V. Sullivan, Chicago Surface Lines, and J. W. Welsh, acting secretary. The following committee chairmen read brief reports as to how the work assigned to their committees was progressing. H. B. Flowers for the committee on traffic regulations; J. P. Barnes for the committee on personnel and training transportation of employees; F. W. Coen for the committee on express and freight traffic promotion and costs; G. T. Seely for the committee on merchandising transportation; H. C. Mosher for the committee on economics of schedules; R. E. McDougall by letter for the joint committee on safety.

The resignation of E. B. Burritt as secretary-treasurer was accepted and J. W. Welsh was elected acting secretary to hold office until such time as the American Association elects a permanent officer.

The committee discussed to some extent the light-weight one-man car now rather extensively used throughout the country. In view of the wave of legislation that has recently developed against this type of car, the committee deemed it advisable to call up the whole question of one-man cars before the American Executive Committee at its meeting April 12 for definite recommendations as to what if any further study can be made by the association.

Safety Committee Holds Enthusiastic Meeting

ON MARCH 28 the joint T. & T. and Claims Association committee on safety held its second meeting of the year at association headquarters. Those present were E. C. Spring, Lehigh Valley Transit Company, and R. E. McDougall, New York & Harlem Railroad, co-chairmen; H. O. Allison, Beaver Valley Traction Company, proxy for W. H. Boyce; J. S. Kubu, New York State Railways; C. B. Scott, Chicago Edison Company; A. J. Van Brunt, Public Service Railway, proxy for H. V. Drown, and W. F. Weh, Cleveland Railway. J. W. Welsh, acting secretary, also attended the meeting.

Representatives of the National Safety Council appeared before the committee and explained plans they had in mind for entering the public safety field and asked the committee for its moral and financial support by urging electric railway companies to take out membership in the council. The committee believed that the good results could be obtained by making the joint safety committee a permanent standing committee and the clearing house for the dissemination of information concerning safety work among electric railway companies.

It is hoped that a joint session of the T. & T. and Claims Association can be arranged at the coming convention for the purpose of discussing fully safety work as recommended by the committee and now being conducted by various electric railway companies, not only as it affects its own employees in the shops but the public as well.

Another meeting of the committee is planned for May 10, at which time it is hoped to complete the report.

Meeting of Chicago Elevated Section

THE Chicago Elevated Railroad Company Section met March 22 with about 185 members in attendance. J. H. Mallon, president, occupied the chair. The address of the evening was by A. L. Gardner on the subject of railroad taxation and the speaker described the various taxes which a railroad pays on its different classes of property. There were also two or three musical numbers presented by the Oak Park Trio and William G. Wood, with dancing by Messrs. Ryan and Coleman.

Camden Section Hears New Traffic Ordinance Explained

THE monthly meeting of the Public Service Camden section was held on March 18 at the Newton Avenue carhouse. The guest of honor and speaker was Frank S. Van Hart, president of the Camden City Council. Mr. Van Hart spoke principally on the traffic situation in Camden, explaining the new traffic ordinance in detail. He said the ordinance was designed for the good of the people and the city as a whole and not to favor any particular class.

Mr. Van Hart commended the drive being made by the trainmen to make a better public feeling for the company and said that not only he but also many of his friends had noticed a great improvement in the manner with which trainmen had handled the public in the last few months. He cited actual examples of how trainmen had gone out of their way to please the patrons of the trolley company. Mr. Van Hart also explained that the City Council was always open to new suggestions or criticisms in relation to the new traffic ordinance and would welcome any communications from the trainmen. The Council realized it was impossible to have the ordinance perfect at first, but it felt that after the present arrangement was tried out, additions and betterments would be suggested and put in force to give Camden the reputation of having the best regulated traffic in the country.

Recent Happenings in Great Britain

Wage Court Recommends Continuation of Present Wages Until Dec. 31 Next—Cost of Proposed Glasgow Electrification Found to Be Prohibitive

(From Our Regular Correspondent)

The report of the Court of Inquiry to the Minister of Labor was published on March 8. It says the wage increases have not advanced at the same rate as the cost of living figure. The claim for increase of wages was made last October. Since then the cost of living figure has both risen and fallen. The court cannot predict its future movements. It recommended that the present wage standard should be maintained until Dec. 31 next; that the Industrial Council for the industry should consider the question of standardization, having regard to the earning capacity of the undertakings and to the interests of the public, and that the Council should examine the circumstances of the lower-paid grades with a view to adjusting their conditions on a more satisfactory basis.

IN THE opinion of the board, the Council should also examine the position of those undertakings which have not observed previous agreements and arbitration awards, and those undertakings should be advised that if possible the advances should be paid in full.

It remains to be seen what action the Ministry of Labor and thereafter the tramway employees will take. If the proposals are adopted by all parties there will be peace till the end of the year. By that time the cost of living may have further declined.

The claim of the tramway men was for an increase of wages of 12s. a week. The court of inquiry was set up by the Minister of Labor. The hearings consumed about ten days of time, spread over a period of several weeks. They were concluded on Feb. 18.

No Electrification Projects

The few references to electric traction made by the chairman of British steam railway companies at the annual meetings of shareholders held during February show that while the existing stringent financial and economic conditions endure there is little or no prospect of any new electrification work being carried out. The London, Brighton & South Coast Railway has tried, but so far without success, to get sanction from the Government for completing the electrification of its system. It was revealed by the chairman of the Caledonian Railway that the directors had considered the question of converting their underground lines in Glasgow and some of the adjacent suburban lines, but that the cost and the prospective traffic did not warrant the change.

While the chairman of the London & South Western Railway was able to say that the electrification of the company's suburban lines continues to be an immense success, he stated that the projected conversion of other lines further out of London has in the meantime had to be dropped. When the directors wanted to place contracts for two of these lines (Cobham and Leatherhead), they found that the cost of electrical equipment had advanced to such an extent as to make it very doubtful whether the work could be carried out for £1,000,000, as compared with a prewar estimate of £250,000. All the companies are, in any case, pledged to abstain as far as possible from new capital expenditure until future conditions and the intentions of the Government with regard to the railways are more fully known. In regard to the completion of the electrification of the suburban lines of the London & North Western Railway, which was stopped owing to the war, that work is in progress, and it is hoped that early next year the new lines will be opened, so that electric trains will run out of and into Euston Station.

Dividend Reduced in 1920

The dividends paid by the group of London underground electric railway companies for the past year are even lower than usual, due to the increased cost of labor and materials. It is true that the companies last summer obtained parliamentary authority to raise fares, but the higher charges were in operation only during the last four months of the year. The records for these four months, however, are so encouraging that Lord Ashfield, presiding at the annual meetings of the companies (which were all held on Feb. 17), was able to take a fairly optimistic view of the future. He based himself, not only on the fact that the increased fares have produced a rise in revenue, but also on the confident expectation that the peak has been reached in wages and cost of materials. He thus looks forward both to larger revenue and smaller expenditure. The former may, however, be delayed by the present trade depression. Another encouraging feature is the beginning of co-operation with the London County Council Tramways—a matter to which I have referred in recent articles in these pages.

Lord Ashfield made a comparison of the receipts during the first three and the last three months of 1920, during the latter of which periods the increased fares were in force, and the results are interesting. (It may be recalled that the minimum fare was raised from 1d. to 1½d., with smaller proportionate increases for the longer distances.) On the associated railways the average receipts per passenger rose from 2.2d. to 3.0d. Taking some of the line separately, on the Central London Railway the receipts increased by 35 per cent, on the City & South London Railway by 30 per cent, and on the London Electric Railway by 27 per cent. In most cases there was a slight decrease in the number of passengers. The London General Omnibus Company, which is associated with the underground railways group, shows a deficit on the year's working, but the receipts for the last three months of the year showed an increase over the first three months of 23 per cent. Lord Ashfield is hopeful that matters will so improve that the railway companies will soon be able to raise the additional capital which they require for carrying out various authorized extensions and improvements. At the annual meeting of the Underground Electric Railways, London, Ltd. (the holding company), held on March 3, Lord Ashfield was even more optimistic as to the future.

Reorganization Plans Carried Out

In connection with the London General Omnibus Company it may be of interest to note the increased cost to the company of the recent transfer of taxation from petrol (gasoline) to the vehicles themselves. In 1920 the amount paid in petrol duty was £141,000, while police licenses for the omnibuses cost £17,000 in addition. For the present year the new taxes, which come in lieu of the petrol duty, have been paid to the amount of £229,000. As this tax is charged by the year, the figure mentioned represents the great bulk of the sum which was chargeable in 1921.

The associated London underground railway companies and omnibus and tramway companies have just carried out a reorganization of their administrative staff on very thorough and comprehensive lines. Lord Ashfield remains chairman and managing director of all these companies.

A remarkable expansion of traffic on the Great Northern & City Railway during recent years was mentioned by Lord Aberconway, chairman of the Metropolitan Railway, at the annual meeting on Feb. 10. The Metropolitan Railway, which is quite separate from the London "combine," and is partly a steam system, took over the Great Northern & City line, which is a tube railway, in 1913. Since then the number of passengers has increased by 75 per cent, and the fares now are nearly double those charged eight years ago.

Sir Eric to Retire

It was officially announced in the House of Commons on March 4 that in August next, when the period of state control of British railways comes to an end, Sir Eric Geddes, Minister of Transport, will retire from office. He is at present engaged in the important work of trying to come to a financial settlement with the companies before the railways are handed back to them, and very large sums are involved. Sir Eric who is not a politician, wished to retire some time ago, but was dissuaded by the Government, which values his services as a railway expert very highly.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Segregation Recommended

Citizens' Committee Wants the Railway Returned to Local Control —Court Urges Conference

The Citizens' Committee of Forty, with Hugh McCloskey, former president of the New Orleans Railways & Light Company, New Orleans, La., as chairman of the advisory committee, has submitted its findings on the utility matter to Judge Foster of the Federal District Court. It is a lengthy document. The report was indorsed by every member of the committee save one, Robley S. Stearns.

Among the recommendations made by the committee, which has been at work more than a month seeking to find a solution for the traction troubles of this city, are that the gas plant and the railway should be divorced, the city being given the option to acquire the railway plant. The committee disapproves the service-at-cost plan, but finds that it is impossible to operate the lines at a fare of less than 7½ cents under present conditions and recommends the issuance of railway tickets at the rate of ten for 75 cents.

RAILWAY WORTH $26,000,000

After considering the valuation placed upon the property of the New Orleans Railway & Light Company by the various experts who have been called in to estimate its worth the committee arrives at the conclusion that the railway proper is not worth more than $26 000,000; the light and power establishment $10,000,000 and the gas plant $8,500,000. Wide latitude is recommended in the readjustment of the franchises, tracks and schedules of the railway so as to insure more economical management and better service.

The committee says that the utility to be able to furnish adequate service should be put on a sound financial basis, and that the management should enjoy the confidence, respect and good will of the people of New Orleans. On this point it says:

> To accomplish this much-to-be-desired result your committee first of all recommends that steps be taken which will absolutely insure strictly New Orleans control and management, and will make it impossible for outsiders to gain control of the new corporation for the purpose of displacing the management and perhaps run the company for their own selfish ends, to the great injury of all the elements of our community.
>
> It will not be difficult to work out a plan which will prevent such a recurrence and the committee will be glad to submit its ideas on this subject in detail in due time. In the meantime we merely wish to suggest that five New Orleans citizens in whose integrity and judgment the public has absolute confidence should be selected as "trustees" charged with the duty of selecting and maintaining a reliable and efficient management for the reorganized company.

The minority report of Mr. Stearns holds that the underlying bonds, approximately $11,000,000, should be recognized dollar for dollar; that the $23,000,000 of other major securities should be recognized at what was paid for them; namely, about 80 cents on the dollar, and that the common and preferred stock, about $30,000,000, par value, should be considered lost by bad management.

Judge Foster invited the members of the Commission Council to meet him and representatives of the advisory committee on March 28 to try to formulate some definite plan of action looking to a solution of the trouble.

Frankford Elevated Operating Contract Up Again

The terms of operation of the Frankford elevated by the Philadelphia Rapid Transit Company are again up for consideration. It seemed probable that the matter would go before the Council on March 31.

Agreement appears to be general that a fare much higher than 5 cents would have to be charged if the road were run by the Philadelphia Rapid Transit Company separate from its other lines and that if the new line were tied in with the present system the rate of fare now in effect for the entire city would have to be increased slightly.

It has been indicated that the Philadelphia Rapid Transit Company, if it is to operate the new line, would want to put into effect at once an increase in its present fare, although the elevated line is not expected to be ready for service until about January, 1922. In this way it might be possible to accumulate a fund against the deficit in the operation of the elevated which is regarded as certain to follow when the line is placed in operation.

The attitude of the Philadelphia Rapid Transit Company on the matter is reflected unmistakably in a letter from President Mitten to the Mayor. Mr. Mitten said:

> Since our meeting of yesterday I feel that I should now state that, with the approval of the Public Service Commission, I am willing to undertake the added burden imposed by the Frankford "L" and Bustleton line, without increasing the basic fare of 7 cents cash, but with the change to five tickets for 35 cents instead of four tickets for 25 cents as now.
>
> Since the operation of the Frankford 'L' during 1921 is the goal toward which we have all long been striving I would suggest that the legal departments of the city and company make every effort to cut the red tape surrounding the awarding of construction contracts by the city, to the end that all possible construction work on Frankford "L" be turned over to P. R. T. for completion, so that its effective organization can be immediately directed to this accomplishment.

Nothing to Conceal

Indianapolis Company Resents Implication that It Tricked City in Fare Appeal

The Indianapolis Street Railway and the Citizens Gas Company are the only Indianapolis public service corporations which have franchise agreements with the city. Both of them have petitions for higher rates pending before the Public Service Commission. Both aver that emergencies exist which require relief, the 1913 public utility law authorizing the commission to act in emergency cases, regardless of franchises. Neither company, however, is affected by the Knapp law, passed by the last Legislature, in which opportunity to surrender franchises is afforded public service corporations.

The Knapp law will go into effect with the general promulgation of the 1921 acts, probably in May. After that time the Indianapolis companies may surrender their franchises and operate entirely under the commission. This fact, however, has thus far had no bearing on the relief petitions pending before the commission on the emergency basis. The emergency set out by the railway company is a cash deficit.

COMPANY ANSWERS THE CITY

A statement issued by Dr. Henry Jameson, chairman of the company board of directors, discussed the attitude of Samuel Ashby, corporation counsel, who has said the city will oppose the company's petition for increase in fares. Dr. Jameson's statement said in part:

> In the matter of the petition of the Indianapolis Street Railway to the Public Service Commission, filed on March 14, asking for needed relief in the matter of increased fares, Samuel Ashby, corporation counsel, makes the statement that he "has reports of the financial condition of the company up to a few months ago," thereby leaving the inference that he has been denied any information in recent months in regard to the company's financial situation. This implication is at once unfair to the company and unfair to the city. It has been the attitude of this company at all times cheerfully to furnish any and all information to the city and to the Public Service Commission in order that a broad and constructive policy might be followed for the benefit of not only the city but of the patrons of the company.
>
> Mr. Ashby further states that "the petition was filed without the knowledge of city officials." Mr. Ashby was present and represented the city in December on the petition of the company asking that a charge of 2 cents for transfers be authorized. Mr. Ashby was fully advised of all of these matters and fully represented the city and did not demur to this order.
>
> It is manifestly unfair and erroneous to attempt to create the impression that the company is attempting some action without the city's being fully advised. Personally, I wish to state that this company wishes at all times to keep the city fully advised and to act with it in a spirit that is friendly and constructive and will accomplish the purpose of securing not only better service, but much needed extensions.

Emergency Commission Bill Signed

Governor of New York Approves Measure Providing Relief from Intolerable Conditions in New York City

Governor Miller of New York on March 30 signed the so-called Knight-Adler bill creating a transit commission to take sole charge of New York City's transportation lines and reorganizing the Public Service Commission for the State. The new law became effective at once. There has been much speculation in regard to the selection of appointees to the new commissions, but it is not expected that the Governor will announce the names of the new commissioners for a week or ten days.

THE measure signed by the Governor is the result of the special message of the chief executive of the state to the Legislature on Jan. 24, relating to regulation of public utilities, with special attention to the urgent condition presented by the transit situation in the city of New York. The Governor declared the vital need was the creation of an agency to deal with public utilities with ample and undivided authority and responsibility.

The bill as passed consists of 124 printed pages. Provisions requiring special attention are, however, confined to comparatively few sections. The act amends the Public Service Commission Law, abolishes the Public Service Commissions for the First and Second Districts and the office of the Transit Construction Commissioner and establishes a single Public Service Commission of five members appointed by the Governor at a salary of $15,000 a year for ten years to have statewide jurisdiction embracing the same class of public utilities as are now under the jurisdiction of existing commissions.

PROVISION FOR EMERGENCY RATES

The act also creates a Transit Commission of three members for a term of five years with an annual salary of $15,000 to have jurisdiction within cities having a population of more than 1,000,000 (New York City), over railroads, street railroads and stage or omnibus lines lying exclusively or partially within such city, and "to such portions of any railroad as lies within such city and is used for local service and is not operated as part of a trunk line railroad."

In addition to all the regulatory powers possessed by the present commissions, both new commissions are given increased power for regulating rates, fares and charges of corporations coming within their respective jurisdictions—including holding companies. They are given power to determine "just and reasonable rates, fares and charges to be thereafter observed and in force as the maximum to be charged for the service to be performed, notwithstanding that a higher or lower rate, fare or charge has been heretofore prescribed by general or special statute, contract, grant, franchise, condition, consent or other agreement, and fix the same by order."

The new commisssions are empowered to order temporary increases or decreases in rates pending the final determination of rate cases before them. All these provisions for regulating rates and fixing temporary rates apply to gas and electric corporations, steam companies and telephone and telegraph companies as well as transportation companies.

In response to the Governor's suggestion that the foundation be laid for a completely unified system of transportation in the city of New York, Article VI is to be added to the Public Service Commission Law. The subject matter of this article directs the Transit Commission to prepare a plan of readjustment for the relief and improvement of transit with a view to "the combination, rehabilitation, improvement and extension of existing railroads," securing sufficient operating revenue on rapid transit lines to make the city's investment self-sustaining and take it out of the debt limit, and with the further view to "the readjustment of the existing rights and obligations of the railroad companies so that the real values in the railroads may be protected and the securities stabilized." The commission is also directed to "cause a valuation to be made of the physical property used in public service of the railroads it proposes to include" in such plan. Such valuation is to be made the basis for all allowances to the railroad companies under the plan. From the valuation so found there is no provision for appeal.

PUBLIC HEARING BEFORE ADOPTION

Procedure for the adoption of the new plan for relief for the companies in Greater New York as outlined in Section 107 of the bill calls for a public hearing before adoption. After adoption the plan must be submitted to the public authorities (Board of Estimate) for approval. This procedure would appear to be merely a matter of form, for if in the judgment of the commission there is justification for carrying out the plan, the commission is directed to proceed with the preparation of contracts, plans and specifications and such other action as may be necessary to carry it out, and "may in the name and in behalf of the city execute and deliver such contract or contracts with full legal force and effect as if all approval of the local authorities had been given," any law to the contrary notwithstanding. The right to accept or reject the program laid down by the commission is, however, made optional with the companies involved. It is to the provision of this section particularly that exception is taken by the city of New York, on the strength of its acknow
edged investment of more than $30
000,000 in the present rapid trans
lines.

The section empowering the commi
sion to prepare a plan for the readjus
ment provides that the plan advanc
by the commission shall contain pr
visions which in the judgment of t
commission will accomplish as nearly
may be the following four main pu
poses:

1. The combination, rehabilitation i
provement and extension of existing ra
roads so that service thereon may be
creased and improved to the fullest exte
possible.
2. The receipt by the city of sufficie
returns from the operation of the railroa
so that the corporate stock or bonds issu
by the city for the construction of ra
transit railroads may be exempted in co
puting the debt incurring power of the c
under the constitution of the state.
3. The readjustment of the existing rig
and obligations of the railroad compan
so that the real values in the railroa
may be protected and securities stabiliz
4. The assuring to the people of the c
the continued operation of the railroads
the present or lowest possible fares c
sistent with the just valuations of the r
roads and their safe and economical op
ation.

Little Hope for Texas Utility A

Municipal home rule representativ
in the House of the Texas Legislatu
by incorporating in the proposed ut
ity act many amendments injurious
utilities have forced proponents of t
bill to kill it by striking out the ena
ing clause. This development leav
little hope for state utility relief un
the next biennial session of the Leg
lature.

The bill was drafted by a comm
tee appointed by the Governor and c
sisting of an equal number of rep
sentatives of municipalities, utiliti
state commercial bodies, House of R
resentatives and Senate. The origi
draft of the bill as prepared by
representatives of the municipalit
was very drastic on utilities. Ma
open hearings were held by the co
mittee, however, and a greatly amen
final draft was passed by a large m
jority of the committee, only
municipal representatives reporting
versely.

The measure then was introdu
into the House and Senate and af
being favorably reported in b
Houses was passed by the Senate.
was held up in the House by munici
home rule representatives and so loa
with clauses inimical to the intere
of public utilities that it became n
essary to kill it.

Northwest Developing Vast Wa
Power Plans

With the Chicago, Milwaukee &
Paul Railroad electrified over most
its Rocky Mountain-Pacific section,
Great Northern intimating it has
ditional electrification plans in m
and intense interest shown by ot
railroads in the prospective devel
ment of a large hydro-electric plant
Wallowa Rapids on the Columbia Ri
it would appear as if the days of c
in the Pacific Northwest were numbe

s a main factor in major transportion.
'he Great Northern plans extensive
evelopment of its Chelan River plant,
vhile the Washington Water Power
'ompany, now supplying current to the
'hicago, Milwaukee & St. Paul road, is
eveloping an additional 15,000 hp. at
pokane and investigating the possi-
ilities of power development at Kettle
'alls, north of Spokane. The outlet for
his additional power is undoubtedly
ie railroads, although no definite state-
ient has been made.

In the passage at arms between
eattle and Portland anent recent rate
djustments from Inland Empire points
› Portland the statement was made at
eattle that the rate was not justified
s the Chicago, Milwaukee & St. Paul
ailroad was now hauling freight to
eattle over the Cascade Mountains at
lower pér ton cost than the Spokane,
'ortland & Seattle road could deliver
ommodities at Portland with water
rade down the Columbia River for the
ntire distance. This would appear to
e a most interesting commentary on
ie advantages of electricity as applied
› major railroad operations.

Campaign Renewed for Jitneys on Broadway

The Broadway Association, New
ork has again raised the question as
› whether the present electric railway
ı Broadway shall be replaced with
nes of buses. This activity is similar
› a move made by the association
bout a year ago. The questions sub-
itted then, however, were confined to
referendum among the members of
ie association itself. The referendum
ote is asked on these questions:

Are you in favor of a through line op-
ated from Bowling Green to Kingsbridge
r a single fare without transfer?
Are you in favor of the continued use of
e present type of green car on Broadway
uth of Forty-fourth Street?
Are you in favor of the removal of the
reet car tracks and the substitution of a
odern bus system operating on Broadway?

The circular of the association says:

Reliable information is that a bus line
n be profitably operated on the entire
ngth of Broadway in Manhattan for a
ngle fare.

City Refuses to Stop One-Man Cars

Union labor organizations in the city
Sacramento, Cal., recently tried to
et the City Commission there to re-
ıse to allow the Pacific Gas & Electric
ompany to operate one-man cars in
at city. They opposed the one-man
r on the ground of safety. The com-
any succeeded in proving that the one-
an cars were not unsafe. The oppo-
tion then switched to the claim that
e commission should rule the cars
t on the ground of civic pride. Fin-
ly, the labor organizations came out
the open and admitted that their
position to the cars was based on the
lief of their being inimical to the
st interest of labor. The measure
as defeated thereupon by a vote of
ur to one. The State Legislature is
w considering similar union labor
easures to prohibit the use of one-
an cars anywhere in the State.

Hot Campaign Closing in Detroit

Private Company and City Engaged in Frantic Effort to Win the Public Vote on April 4

With the approach of the election at Detroit, Mich., on April 4, when two questions pertaining to railway matters are to be placed on the ballot, the Detroit United Railway is urging the adoption of its service-at-cost ordinance as a means to settle the railway controversy in Detroit, while the Street Railway Commission is urging the people to approve the purchase by the city of about 25 miles of Detroit United Railway lines.

THE D. U. R. has been conducting a campaign to educate the voters as to the provisions of the company's ordinance, using newspaper advertising and street car posters, fostering public discussions and sending copies of the proposed ordinance to each registered voter in the city. *Electric Railway Service*, the company's weekly publication, has also devoted considerable space each week to analyzing the company's proposed ordinance.

FOUR MAIN POINTS CONSIDERED

F. W. Brooks, president of the Detroit United Railway, is quoting Delos F. Wilcox's pamphlet "Flexible Fares" against Mr. Wilcox. Mr. Brooks states that the Detroit plan has been patterned after the Cleveland plan with such additions and improvements as in the years of Cleveland experience, have been found necessary to improve the measure. He further maintains that every minor fault that Mr. Wilcox has ever expressed in print with the Cleveland plan has been corrected in the Detroit service-at-cost plan, and that in Detroit as in Cleveland, service-at-cost means peace and order instead of strife and chaos.

On the other hand the city officials have sent out to the voters a pamphlet containing an official report to Mayor Couzens by Delos F. Wilcox, analyzing what is termed "The D. U. R. Square Deal Service-at-Cost Franchise." It is stated in the pamphlet over the signature of Mayor Couzens that the services of Mr. Wilcox were secured that the citizens might get the best possible analysis of the Detroit United Railway plan by a neutral authority.

CHIEF OBJECTIONS OUTLINED

A summary of what appears to Mr. Wilcox to be the chief defects of the ordinance from the public point of view enumerates: granting a thirty-year blanket franchise; highest valuation for the company property; no-limit fare; appeal to the courts wiped out; premium on inefficiency; Detroit United Railway wrote its own contract; possibility of abrogation of the terms of the contract through legislation or action of the State Utilities Commission without the city's consent.

The city's pamphlet also summarizes briefly a number of undesirable features of the service-at-cost ordinance pointed out by the Corporation Counsel, and after reviewing briefly the progress made by the Street Railway Commission since April 5 last, when the $15,000,000 bond issue was approved by the people, explains the provisions of the city's purchase plan. The purchase plan is stated to be a progressive step in carrying out the municipal ownership plan approved by a 63 per cent vote of the people last April. The lines in question will be purchased with money derived from the original bond issue and additional funds are not required.

Several suits involving the city and the Detroit United Railway are still pending, among which is the action brought by the Detroit United Railway against certain city officials involved, for contempt of court in not obeying the temporary restraining order against the city crossing the Mack Avenue line with the tracks of the St. Jean line of the Municipal Railway. John A. Mercier, the contractor who constructed the first stretch of municipal roadbed last year, has brought suit against the Street Railway Commission to prevent the city from going ahead with construction work with its own forces on a stretch of line where Mr. Mercier holds the contract to do the excavating and to lay the concrete bed. A different type of construction is now being used by the Street Railway Commission and the contractor refused to change his contract to conform with the new specifications. Considerable money can be saved by changing to the new type of construction, Joseph S. Goodwin, manager of the municipal lines, believes.

Taxpayers' Suit Heard

Arguments on the motion of the fourteen taxpayers to dismiss the Stone & Webster suit to enjoin them from making the Puget Sound Power & Light Company a party to their suit against the city of Seattle, in the matter of disposition of funds of the Seattle Municipal Railway, were completed recently in Judge Jeremiah Neterer's Court, along with arguments on the company's plea for an injunction against the taxpayers. Judge Neterer reserved decision in the action of the company against the taxpayers.

Attorneys for the traction interests sought to show that the taxpayers contemplated an attack on the special fund created in the contract for payment of bond interest and principal. He asked whether the court would shut the door on the company and make it take its chances on what would happen on Sept. 1, when the next interest payment is due, and on March 1, when $833,000 of the principal is due as well. Attorneys for the taxpayers denied that any breach of contract was sought, but that the action was simply taken to protect the city's general fund.

43 per Cent Wage Reduction

Company at Davenport Unable Longer to Stand High Wages, Jitney Competition and Political Opposition

Unable longer to bear the brunt of unregulated jitney operation, high wages and continued political opposition from a Socialist City Council, the Tri-City Railway, Davenport, Iowa, on March 25, notified employees on the Iowa lines that a 43 per cent reduction in wages would go into effect on April 1. The new scale for trainmen will be: Men under six months, 36 cents an hour; men over six months and less than one year, 38 cents an hour; men one year or over in company employ, 40 cents an hour; shop and carhouse men, 40 cents maximum.

The present scale carries a 70-cent maximum and has been in force since June 1 last. It was negotiated under the condition that the company receive sufficient fare to pay the increase in wage. It was agreed on following arbitration.

Since that time the City Council in Davenport has refused to allow the company to install one-man cars, has threatened an increase in taxation and has repeatedly refused to increase fares, the traction lines finally being forced to go into court and secure by injunction a 9-cent fare, with three tickets for a quarter. This fare has, however, been greatly discounted by unregulated taxi and jitney competition.

The railway recently went into court and secured an injunction against forty-six of the jitney buses which were violating the city ordinances and which the Socialist City Attorney refused to stop.

UNION CHIEF DISCHARGED

The president of the local union of railway employees made a speech at the City Council attacking one-man cars, a speech which is regarded as largely instrumental in the defeat of this plan of operation. The union head also criticised company discipline and was discharged as a result of a statement the company declares was untrue.

Members of the City Council asked the head of the union to apologize to President B. J. Denman of the traction lines, but he refused to do this and a strike vote followed by the Davenport, Rock Island and Moline trainmen. No date was set for a strike but negotiations have so far proved fruitless. In the face of this situation the company has announced the reduction in wages.

The men, in the effort to secure the reinstatement of their deposed chief, have invoked state arbitration through Governor N. E. Kendall of Iowa under a law of 1913. This law makes investigation of the case at issue by an arbitration board compulsory on the petition of more than twenty-five disinterested parties. The Governor has notified the company and the trainmen to select five names each, from which he will appoint two arbiters, these two to select a third.

The finding of the board, however, is not compulsory unless both sides to the controversy agree to accept its decision and the Tri-City Railway has signified unofficially that it will not accept this decision as it does not consider the discharge of a man on the ground of disloyalty as a subject to be arbitrated.

The company, however, has evinced a disposition to arbitrate the new 40-cent wage scale, but not on the basis of the present 70-cent scale. The company will likewise refuse to agree to accept the finding of an arbitration board on a wage scale if it considers the finding of the board in terms of wages beyond its financial ability to pay.

Massachusetts Strike Threat

Amalgamated Regards Retrenchment Program of Eastern Massachusetts as Attempt to Crush Union

Reply has been made by the Amalgamated Association at Boston, Mass., through Counsel Vahey to the notification issued on Feb. 25 by the trustees of the Eastern Massachusetts Street Railway that at the expiration of the existing wage and working agreement on May 1, a reduction of 20 per cent in wages would go into effect. The trustees further stated that they desired and intended to cancel the entire agreement at that time, and that their letter should be construed as an official notification of that intention in accordance with the terms of the agreement as to changes, amendments or continuation.

Formal action on the matter was not taken before on account of the absence of Mr. Vahey from Boston. After reviewing the situation Mr. Vahey issued a lengthy statement to the papers denying the right of the trustees to cancel the agreement in its entirety and charging an attempt to disrupt and break up the union. Mr. Vahey takes the stand that the trustees are distinctly antagonistic and unfair to organized labor and that they have taken an arbitrary and unwarranted stand in the present instance, in refusing to arbitrate the matter. He intimates such action may cause the men to strike.

As a matter of fact the trustees ha not made any statement relative what position they will take sho arbitration be suggested or demand Their attitude is that the public is manding lower fares and the bigg obstacle to any fare reduction is present wage scale.

Letters have been sent by the tr tees to the local "Home Rule Comn tees" of citizens in the various cit and towns served by the company, viting them to meet the trustees discuss the expected reductions wages and to express their opinion discuss as to the best means of pass along the reduction to the public. I the announced intention of the trust to return to the public every dol saved by wage reductions, either equivalent reductions in fares, impro service or both. In all their publis statements the trustees are stand squarely on the issue that lower fa for car-riders hinge on lower rates wages.

The accompanying comparison hourly wages of the various classes employees in 1915 and 1920 has b issued by the trustees.

The trustees have received a petit for the restoration of service in Gl cester, Mass. Service there was s pended nearly a year ago as the li did not earn expenses and the c authorities failed to agree to make the deficit by taxation. This lat petition is of especial interest as it v signed by some of the former employ who have been out of work since cars ceased to run. These men ha now expressed their willingness to w at the reduced rate of wages which trustees have announced to go i effect on May 2, on the entire system

COMPARISON OF WAGES OF EASTERN MASSACHUSETTS STREET RAILWAY EMPLOYEES

	Cents per Hour			
	1915	1920	Increase	Per C
Conductors and motormen	26.83	62.00 *66.74	35.17 39.91	13 14
Car cleaners	21.89	58.00	36.11	16
Watchmen	18.38	58.00	39.62	21
Armature winders	28.24	63.00	34.76	12
Pitmen	24.80	61.00	36.20	1
Machinists	27.62	63.00	35.38	12
Carpenters	28.88	62.00	33.12	11
General helpers	20.72	58.00	37.28	17
Trackmen	22.2	58.00	35.8	13
Firemen	27.76	66.00	38.24	13
Oilers	25.93	62.00	36.07	13
Assistant engineers	33.76	76.00	42.24	12

*Operators of one-man cars.

Officials of the union have denied t the Gloucester men would work at proposed wage scale, but the trust have the petition bearing the signatu of a number of the men.

Jersey Jitneys Jolted

Following a prolonged debate the S ate of New Jersey by a vote of twe to three has passed the measure r ulating jitneys and placing their ope tion in certain particulars under jurisdiction of the Public Utility Co mission. The bill, effective from Ma 15, does not affect jitneys in operati prior to that date.

News Notes

ity Road Made All-American. —
nty-five employees on the Seattle
ash.) Municipal Railway who have
become American citizens will be
oved from the payroll and sup-
ted by citizens.

/age Settlement Expected.—No de-
on had been reached up to March 29
he wage contracts submitted by the
men's union to the Community
ction Company, the successor to the
way property of the Toledo Rail-
s & Light Company, Toledo, Ohio.

exas Line Reduces Wages.—The
hita Falls (Tex.) Traction Com-
y has announced a reduction of 11
cent in wages of conductors and
ormen, the cut to be effective from
rch 15. Decreased revenue is as-
ned as the cause. The trainmen
e accepted the wage cut.

**ill Against Expenditures for Pub-
y.**—A bill was introduced in the
embly of New York on March 8
Mr. Antin adding new section 230a
he Public Service Commissions Law,
viding that no expenditure for pub-
y purposes by any corporation sub-
to jurisdiction of Public Service
Transit Commission shall be allowed
an element in fixing fares or
rges.

ity Sues to Recover for Paving.—
city of Danbury, Conn., has filed a
to recover $18,000 damages from
Danbury & Bethel Traction Com-
y due to the fact that the city was
ed to pay for the paving of the
ks of the railway last year be-
se the company did not have enough
ds to carry out the work. Cor-
ation Counsel Samuel A. Davis has
complaint in the Superior Court
Bridgeport in the interest of the
.

**layors Opposed to Traction Meas-
.**—A measure has recently been in-
duced in the Legislature by Assem-
man George D. Brady, Buffalo, which
uld vest in the Public Service Com-
ssion power to regulate the amount
pavement costs to be paid by trac-
n companies regardless of agree-
nts between companies and munici-
ities in which they operate. The
te Conference of Mayors cited
rty-one reasons in opposition to the
.

Brooklyn Lines Assessed Too High.
The Brooklyn City Railroad, the Pros-
t Park & Coney Island Railroad, the
rth Beach Railroad and several other
ooklyn surface and elevated lines
re granted recently by Justice Man-
g in the Supreme Court a writ of
tiorari requiring the State Tax Com-
ssion to show cause in Albany on
May 9 why the franchise assessment of the lines should not be reduced. The total amount of the assessment is $39,077,930, which the lines contend is $13,704,132 too much.

Chamber of Commerce Plans Railway Survey.—A plan for a special committee of five men to make a survey of the operating and financial conditions of the Pittsburgh (Pa.) Railways, with a view to assisting the company to better local conditions, was adopted by the Chamber of Commerce of Pittsburgh on March 16. The resolution asking for the appointment of the committee was sponsored by the chamber's regular committee on municipal affairs and approved by the board of directors.

Bills Still Being Introduced.—Considerable legislation continues to be introduced in the Indiana General Assembly affecting interurban lines. A bill passed the House recently by unanimous vote empowering the Public Service Commission to prescribe headlight regulations for interurban cars. A strong attempt was made on the part of enemies of public utilities to pass the Harris House bill, which would compel electric railways whose lines cross those of steam roads to pay for the upkeep of the crossing on a wheelage basis. The bill has been indefinitely postponed. This kills it so far as the present session is concerned.

Railway Employees to Hold Reunion. A reunion of all employees of the Massachusetts Northeastern Street Railway, Haverhill, Mass., will take place at Canobie Lake Park, Salem, N. H., on May 20, for the benefit of the mutual relief fund of the company. This Mutual Relief Association is an incorporation formed for the purpose of furnishing death benefits and relief to ill and disabled employee members of the association. During the past season the association paid out more than $1,700 in sick and death benefits and all efforts will be made to raise this amount in the spring meeting.

Electrical Workers Return.—After a strike of sixteen days, the electrical workers, including linemen and substation operators of the British Columbia Electric Railway at Vancouver and Victoria have returned to work. The dispute was over wages. The company rejected the award of a conciliation board on the ground that its decision was based on conditions last August and offered a 10 per cent reduction. The deadlock was broken by the company granting the men their requests and signing up an agreement on the basis of the award. During the strike, the light, power and railway service was maintained by the substations being operated by office employees of the company.

Indictments Dismissed. — Supreme Court Justice Edward Lazansky has dismissed the indictment against officials of the Brooklyn (N. Y.) Rapid Transit Company, which were secured following the Malbone Street tunnel wreck in 1918. In the accident more than ninety people were killed and several hundred were injured. The officials of the road from the motorman to the general manager were indicted but no convictions were secured. District Attorney H. E. Lewis, on whose motion the indictments were dismissed, stated to the court that in view of the circumstances as to the evidence and the great expense attached to the trials he did not feel justified in again bringing the men to court.

Active Year for Safety League.—The Ontario Safety League, Toronto, Canada, recently published a statement reviewing its activities and accomplishments for the year 1920. In an effort to prevent accidents the league has carried on an intensive and extensive campaign throughout the province of Ontario. By the distribution of bulletins, circulars, leaflets, etc., and by means of conferences, posters, motion pictures and lantern slides, the appeal has reached practically every city and town in Ontario. The most notable activity of the year was a three-day safety convention in April last, at which important papers were read and discussed by representatives of industry from Ontario, Quebec, Nova Scotia and Manitoba. This convention together with a "Safety Week" drive in October had far-reaching effects.

Des Moines Railway Starts Advertising Campaign.—Homer A. Miller and F. C. Chambers, receivers for the Des Moines (Ia.) City Railway, have started an advertising campaign to acquaint the car riders of that city with the comparison between the general good done in Des Moines by the company and its competitor, the motor bus. Every day during the week ended March 26 an advertisement appeared in all of the city dailies, each message being devoted to some particular side of the question in the war between the railway and the buses. In addition to the newspaper advertising letters have been mailed to a large number of business men of the city to give them a better understanding of the actual situation.

Perpetual Franchise Upheld. — An opinion was handed down by Judge A. M. J. Cochran in the United States District Court at Covington, Ky., during the week ended March 26, in which he held that the South Covington & Cincinnati Street Railway has a perpetual franchise on certain streets in Fort Thomas, Ky., and that an ordinance is void that was passed by the Board of Trustees of Fort Thomas on Feb. 16, 1917, by which it was sought to compel the company to pay rentals on Mt. Pleasant, Dundee and Highland Avenues. The suit was filed by the railway against the town of Fort Thomas three years ago, seeking an injunction to prevent the collection of rentals on the thoroughfares mentioned. Judge Cochran held the certain grants made by the Highland Park Land Company were legal and that the company had installed tracks on some of the streets before they were used as thoroughfares in the town of Fort Thomas.

Financial and Corporate

P. S. Net Falls

Passenger Revenue and Traffic Increase of 15 per Cent Fails to Offset Increased Costs

According to the twelfth annual report of the Public Service Railway, Newark, N. J., for the year ended Dec. 31, 1920, the company did not earn sufficient to meet operating expenses and fixed charges excluding any amount for amortization and depreciation.

In speaking of rates the report said that the efforts to secure a rate adequate to requirements have, broadly speaking, been practically continuous since early in March, 1918, when the first application was filed with the Public Utility Commission.

INCOME STATISTICS—PUBLIC SERVICE RAILWAY

	1920	1919	Per Cent Change
Passenger revenue	$26,200,000	$22,600,000	+15.9
Operating revenue	27,881,990	24,146,251	+15.5
Non-operating income	108,706	71,774	+51.4
Gross revenue	27,990,696	24,212,025	+15.0
Operating expenses and taxes	$23,548,878	$19,624,065	+20.0

TRAFFIC STATISTICS—PUBLIC SERVICE RAILWAY

	1920	1919	Per Cent Change
Miles of line	538.173	539,031	— 0.16
Miles of revenue track	851.390	852,310	— 0.11
Total revenue per mile of line	$52,000	$43,100	+20.5
Total revenue per mile of revenue track	$32,900	$27,250	+20.7
Revenue passengers	363,757,587	(a) 327,619,606	+11.0
Transfers and passes	89,777,107	69,069,628	+30.0
Total passengers	453,534,694	396,689,234	+14.3
Percentage of passengers using transfers	17.7	15.4	(b) + 2.3
Average fare per passenger (cents)	5.79	5.71	+ 1.4
Car-mileage	60,798,743	57,644,927	+ 5.5
Car-hours	6,539,207	6,039,453	+ 8.2
Passengers carried per day	1,239,166	1,086,820	+14.1
Passenger receipts per car-mile (cents)	43.21	39.29	+10.0
Per car-hour	$4.02	$3.75	+ 7.2
Ratio car-miles to car-hours	9.30	9.54	(b) — 0.24
Estimated population served	2,423,225	2,125,356	+14.0
Rides per capita	187	186.5	+ 0.27

(a) Mile zone system in effect Sept. 14 to Dec. 7, 1919.
(b) Difference.

The 1919 report expressed the hope that there remained but the presentation of certain testimony collected by the commission as to real estate values, summing up by counsel, and decisions by the commission to fix the value of the company's property. The last formal hearing in the case was held on Feb. 26, 1920, and a reasonably prompt decision was generally expected, but certain circumstances intervened to prevent.

The Legislature of New Jersey, the report goes on to say, in response to a well-defined public demand for an independent valuation of street railway property, passed an act which became effective May 5, 1920, creating a special commission of state officials authorized to appoint a firm of engineers to appraise the properties of any or all of the street railway companies in the state. The act provides that the valuation of a property so determined is to be accepted as evidence by the Public Utility Commission in its determination of a reasonable rate for that company.

Subsequent to the passing of this act the Public Utility Commission took no further action in the matter of fixing the value of the railway's property. Pursuant to the act, Ford, Bacon & Davis, New York, were selected to make the valuation. Work was undertaken about Aug. 1 and the valuation is expected to be completed very soon.

On Dec. 7, 1920, the railway filed with the Public Utility Commission a schedule of rates calling for a 10-cent fare with free transfer, to be effective Jan. 1, 1921. This rate was suspended by the utility commission pending hearings, but the removal of the commissioners made hearings impossible. With the appointment of a new commission and the completion of the valuation of the company's property an early determination is expected.

Notwithstanding former trying experiences, the year 1920 was one of the most difficult. During more than three months weather conditions made operation not only difficult but expensive. By the use of all its facilities and almost superhuman efforts on the part of the operating force during the severe storms, the lines were kept in operation, reflecting great credit on the personnel and a most favorable comparison between this and other systems operating in large communities where many sections were not operated for a considerable period after such storms. Again, during the outlaw strike of steam railroad labor in the spring of 1920 commutation train service on practically all railroads was suspended and the burden of transporting commuters from the northern part of the state to the several ferries reaching New York City was handled by the rail way in a way that merited general commendation.

The labor situation during the greater part of the year was a difficul one, not only on account of shortage by reason of the higher rates paid by othe industries, so that on May 1 the company advanced the pay of trainmen cents per hour and made corresponding increases in other departments.

To provide improved service, particularly on lines of light traffic, by giving a shorter headway with more economically operated equipment, 200 safety cars which can be operated by one man were adopted. On Sept. 5, 1920, the first regular service with this type of car was started on the Riverside line in Paterson. By the close of the year seventeen lines in Passaic, central division, had been equipped with these cars the service of which is satisfactory and fully up to expectations. In order to accommodate the dense traffic on heavy city lines, where the small safety car is unsuitable, the trailer type of car was adopted. At the close of the year only one of the 100 ordered had been received. This has been tried on a number of different lines and operates in a very satisfactory manner.

In order to provide better facilities for coping with snow troubles, fifteen double truck snow plows and sixteen single truck snow sweepers were also contracted for during the year.

During the year 18.97 miles of track was reconstructed of new rail and 4.102 miles with same rail. Track extensions built during the year totaled 1.468 miles. The total trackage of the system now is 897.721 miles.

The ferries operated by the company from Edgewater and Bergen Point showed substantial increase in business during the year. During labor troubles in New York Harbor, however, the ferry employees of this company remained loyal and service was not interrupted from that cause.

The cost of claims against the railway including expenses of administration during the year was $1,276,846.46, or 4.9 per cent of the gross receipts. Notwithstanding the increased number of vehicular accidents due to the large use of motor vehicles, the figures compare favorably with the previous year in which the cost amounted to 5.3 per cent of the gross receipts.

Statistics as to operation are presented in the accompanying tables.

La Fayette Company Organizes

The La Fayette Service Company, La Fayette, Ind., which some time ago took over the La Fayette section of the Fort Wayne & Northern Indiana Traction Company, has announced its permanent organization as follows: President, Walter L. Haehnlen, Philadelphia, Pa.; vice-president, Clyde W. Reed, Fort Wayne, Ind.; secretary-treasurer and general manager, R. W. Levering, La Fayette, Ind.

Franchise Abrogation Bill Seems to Be Doomed

Abrogation of the perpetual fran- ses enjoyed by the Columbus Rail- y, Power & Light Company, on cer- n streets of Columbus, Ohio, pro- sed in the bill introduced by Senator F. Atwood of Columbus, seems very likely as the result of the action of e Ohio Senate last week in sending e bill back to another committee.

The measure has been reported out the committee on cities with recom- endation for passage, but when it me up on the calendar for passage determined attack upon it by Cleve- d and Cincinnati Senators resulted its being referred to the public utili- s committee, which is said to be any- ng but friendly to the measure. view of the vote in favor of recom- tment the possibility of the bill com- out now seems very doubtful.

Opposition on the part of the Cin- nati and Cleveland solons is due to e fact that many citizens and insti- ions in those cities own stock and ld bonds of the Columbus Railway, wer & Light Company, which would still further depreciated if the future the company and its credit are made secure by repeal of the perpetual anchises.

Senator Atwood introduced the bill the request of a group of Columbus izens interested in making it possible r the city to obtain terms from the mpany when the present blanket fran- ise expires in 1926. Only by legisla- e action can the perpetual franchises ld on streets other than those covered the blanket franchise be terminated, d it is charged that undisturbed re- ntion of the franchises gives the mpany a hold in Columbus detri- ental to the interests of the citizens.

Charles L. Kurtz, president of the lumbus Company, told the Senate mmittee on cities, by which the bill as reported for passage, that enact- ent of the Atwood bill would handi- p the company in its effort to refi- nce itself; that investors will cease buy securities if informed that all anchises are to end in a few years, d that the company would face un- rtainty in getting a new grant in 1926.

Indiana Company Sells Stock Direct to Public

Some time ago Harry Reid, presi- nt of the Interstate Public Service mpany, Indianapolis, Ind., decided to fer an issue of the 7 per cent prior n stock to patrons of the interurban s and light properties operated by e company. In commenting on the ccess of the offering Mr. Reid said:

> In spite of the fact that the money market s been described as tight, and stocks and nds generally have not been absorbed rapidly as in normal times we have sold proximately $500,000 of our 7 per cent ior lien stock. The people of this State ve money to invest and will put it in und, profitable investments.
>
> Our company naturally is pleased to find at its customers have enough faith in it place some of their savings on surplus ıds with us. It makes them partners the enterprise. It seems to me that this partnership relation will be beneficial both to the company and to its patrons. The public utility business is really the people's business, anyhow, and the closer the relationship between the companies and the people the better it will be for both.

The Interstate Company handled this issue through its own employees, selling the stock at par at its branch offices.

1920 a Profitable Year in Charlottesville

The Charlottesville & Albemarle Railway, operating in Charlottesville, Va., was one of the few public utility companies operating railways as a part of their system that paid both preferred and common stock dividends in 1920. This is favorable indeed in view of the fact that the company is still operating on a 5-cent fare on its 3.5 mile line. With the hope of costs decreasing it was decided to continue at the old rate, and make every effort to increase patronage. The accompanying illustration shows the company's appeal for new patrons. The railway's report for the year just ended is also good in view of the fact that lighting and power rates have only been increased to cover the rise in the cost of coal. During the year $30,925 was spent for permanent improvements, the largest expense being for two combustion Engineering Corporation's heavy duty type "E" automatic stokers. The income statement for the past two years follows:

BIDDING FOR TRAFFIC IN CHARLOTTESVILLE

INCOME ACCOUNT — CHARLOTTESVILLE & ALBEMARLE RAILWAY

Item	1920	1919	Per Cent Change
Operating Revenues:			
Railway..........	$60,226	$50,957	18.2
Light and power.....	138,003	102,054	35.2
Total............	$198,229	$153,011	29.5
Operating Expenses:			
Railway............	$42,755	$35,977	18.8
Light and power.....	67,999	43,183	57.6
Depreciation........	20,000	....	....
Total............	$130,754	$79,160	65.3
Net revenue from operation............	$67,475	$73,851	— 8.6
Non-operating income..	634	761	—16.7
Gross income........	$68,109	$74,612	— 8.7
Fixed charges.......	35,499	33,115	7.2
Net corporate income	$32,610	$41,497	—21.4
Dividends on pf. stk..	8,589	8,589	......
Dividends on cm. stk.	15,000	25,000	—40.0
Surplus..........	$9,021	$79,08	14.1

Net Income of $103,736 in East St. Louis

A 4 per cent dividend, totaling $77,600, has been declared by the East St. Louis (Ill.) Railway on the company's capital stock of $1,940,000, according to an announcement by W. H. Sawyer, president of the company. This is the largest dividend the company has voted in several years. The road is controlled by the East St. Louis & Suburban Railway.

A financial statement presented at the annual meeting and made public by Mr. Sawyer shows that the net income of the East St. Louis Railway during 1920 was $103,736. The balance remaining after the payment of the 4 per cent dividend will be added to the credit balance of the company, making the total $235,514. The statement follows:

INCOME ACCOUNT OF THE EAST ST. LOUIS RAILWAY

Operating revenues		$1,182,704
Operating expenses, depreciation, etc.		941,051
		$241,653
Taxes		45,000
Operating income		$196,653
Deductions:		
Interest on bonds..	$98,470.00	
Miscellaneous interest, discounts, etc.	3,422.28	
		101,892
		$94,760
Non-operating income		8,975
Net income		$103,736

According to Mr. Sawyer the operating income of the company was approximately the figure that the Illinois Public Utilities Commission had fixed, the losses for the first few months of the year before the 8-cent fare became effective having been made up in the closing months. The commission had placed $195,000 as a fair income for the East St. Louis Railway after paying operating expenses, depreciation, power and other rentals.

This is the first time that a statement of this kind has been made public. Mr. Sawyer said that he expected the revenues of the company in 1921 would be in the neighborhood of last year's total, pointing out that the recent cut the Public Utilities Commission has ordered in fare would probably result in showing an increase the first part of the year over the corresponding period of 1920, but that the closing months would see a reduction as compared with the previous year.

New Interurban Contracts Being Negotiated

Wilfred Cann, street railway commissioner, and Frank R. Coates, president of the Community Traction Company, Toledo, Ohio, conferred with twenty representatives of interurbans entering the city in a preliminary meeting on Feb. 12 in the matter of new contracts for use of city tracks at Toledo.

The Milner ordinance provides that the interurbans could use the streets on the terms of old contracts only until new ones could be negotiated. The contracts are subject to arbitration.

The Toledo & Western Railroad, through its receivers, has asked the Public Utilities Commission to allow it to take Toledo off its tariff and substitute West Toledo for it, so that fare changes within the city limits could be adjusted to local conditions without the filing of a new petition and tariff every time the fare changed in the city limits. The company seeks in the petition to make its city fare agree with the 6-cent rate of the Community Traction Company, by March 14.

It is thought that this will be the course of action of practically all of the interurban lines entering the city. They will be regulated by tariff only to the city limits and then by contract adopt the city fares to agree with those set in the Milner ordinance.

The Toledo, Ottawa Beach & Northern Railway, one of the remaining Doherty lines at Toledo, has also filed a tariff making its city fare agree with the Community lines and increasing its fare to Toledo Beach, Mich., by 5 cents.

Financial News Notes

Back Coupons and Interest Paid.—Jan. 1, 1921, coupons on the New Orleans Railway & Light Company, general mortgage 4½ per cent bonds will be paid on and after March 31, 1921, upon presentation at the office of the New York Trust Company, N. Y., or the Hibernia Bank & Trust Company, New Orleans, La. In addition to the face amount of the coupons 28 cents interest thereon will be paid.

Sales of Roads Under Foreclosure Directed.—Judge Cummings at Sunbury, Pa., on March 18 directed the sale of the Sunbury & Selinsgrove Electric Railroad, the Sunbury, Milton & Lewisburg Railroad and the Chillisquaque Connecting Railroad, which have been in receivers' hands for more than seven years. The order of sale of the three properties was made to satisfy mortgage bond claims of more than $600,000, upon which interest is in default.

Valuation Protested.—A hearing to determine the validity of the valuation of the property of the Fargo-Moorhead Street Railway, Fargo, N. D., as ascertained by the State Railroad Commission, will be held on April 18. Notice of the hearing was filed with the City Commission on March 16 by the State Railroad Commission. According to this notice the railway recently protested against the valuation of its property as fixed by the commission.

Fewer Passengers in Toledo.—According to Street Railway Commissioner Cann there were 5,000 fewer daily electric railway passengers in Toledo, Ohio, in the month of March. He believes the decrease is due to the industrial depression which is now beginning to have its effect in the supply of ready money citizens have on hand. The Community Traction Company will report a deficit for March, it is estimated, of more than $75,000 as compared with a deficit of $58,000 for the previous month.

Appeal of City for Co-receiver Denied.—Declaring that if he later considers it advisable to appoint a co-receiver to represent the city's interest he will do so, Judge H. H. Watkins, at Anderson, S. C., on March 19 announced that he will leave the affairs of the South Carolina Light, Power & Railway Company, Spartanburg, S. C., temporarily at least, in the hands of George B. Tripp, vice-president and general manager of the company, and J. B. Lee, a director of the corporation, who were appointed receivers on Feb. 17.

Cable Cars Put on a Car-Mile Basis.—The United Railroads, San Francisco, Cal., has about 14 miles of cable railroad which will probably never be electrified because the grades range up to 19.8 per cent. In figuring up the earnings on this cable system, it is interesting to note that the cable cars show average earnings per car mile of 47 cents compared with 36 cents for the electric lines, but on the basis of car-hour earnings, the cable lines average $3.26 whereas the electric lines average $3.35. The explanation lies in the fact that the cable lines operate over comparatively short routes at slow speeds, averaging only about 6½ m.p.h.

Berkshire Company Faces Receivership.—Receivership for the Berkshire Street Railway, Pittsfield, Mass., is inevitable unless legislative relief is granted immediately, L. S. Storrs, vice-president of the company, told the legislative committee on street railways sitting in Pittsfield. The road operates 75 miles of tracks in Berkshire County. The New York, New Haven & Hartford Railroad, which owns stock, has put $6,000,000 in the property. According to the figures presented by Mr. Storrs the company's deficit last year was $100,000 and it now owes $94,000 for taxes, $40,000 for fuel and other essentials and has only $15,000 on hand. The parent company is willing to sell the property at a state appraised valuation and have it run by trustees like the Boston Elevated Railway.

Only $42,265 Earned to Meet Charges.—The Dallas (Tex.) Railway reports a gross income of $262,675 for the month of February, 1921, while the operating revenue for the same period was $220,410, not including interest on bonds, stocks, notes, commissions or discounts on loans or costs of raising money, rental on the Oak Cliff lines owned by the Northern Texas Traction Company, or dividends on stocks, which leaves a balance earned for return on the investment of $42,265. These figures are given in the financial statement submitted to the supervisor of public utilities covering the month of February and the forty-one months under which the company has been operating under the present franchise. The earnings of the company are set forth in detail in a statement which has been published in all the newspapers of Dallas as a display advertisement.

Property of United Railroads Sold.—The United Railroads, San Francisco, Cal., was sold to Frank D. Madison, attorney for the reorganization commottee, at receiver's sale on March 21 for $7,000,000. Mr. Madison, representing the committee, which consists of Frank B. Anderson, William H. Crocker, Herbert Fleishhacker, E. S. Heller and John D. McKee, submitted the only bid. The sale practically completes the long labors of the reorganization committee. Mr. Madison said after the sale that only about 2 per cent of the United Railroads 4s remained undeposited, and that practically all the Sutter Street Railroad & Omnibus Cable Railway bondholders had agreed to the reorganization plan. The successor company will be known as the Market Street Railway. The terms of the reorganization have been reviewed at length previously in the ELECTRIC RAILWAY JOURNAL.

City Protests Expenses of Receivership.—Formal objections to the inclusion of receivership expenses in the cost of the New York Municipal Railway Corporation under its contract with the city have been filed by Transit Construction Commissioner John H. Delaney with Receiver Lindley M. Garrison and also with Daniel L. Turner, chief engineer to the Transit Construction Commission, whose duty it is to determine the propriety of construction costs. Up to Dec. 31, 1920, the receivership expenses aggregated $472,380, of which $274,035 was allotted to the rapid transit lines and the remainder to the surface lines which do not come under the contract with the city. The commissioner objects especially to the inclusion of the compensation and allowances for disbursements by the receiver which amounted to $174,999 and to similar payments for his solicitor Karl M. Owen, $7,945.

Return of Equipment Sought.—The General Electric Company has become one of the intervenors in the Des Moines (Ia.) City Railway case. It demands $68,466 from the railway. The suit is brought to intervene in the action by the North American Construction Company. The company seeks to protect its investment in equipment which it has furnished to the Des Moines City Railway. The action is based upon sixteen promissory notes and five contracts signed by officers of the Des Moines City Railway during 1918. In its petition the General Electric Company asks that the federal court recognize the ownership of the equipment in the General Electric Company because of stipulations to that effect in the contract between that company and the railway. If the money is not paid within sixty days the General Electric Company asks a court order directing the Des Moines City Railway to return the equipment.

Traffic and Transportation

Mr. Dana Talks on Spreads

oston Elevated Railway Explains to Men Difficulty of Eight Hours in Ten

The bulletin for March of the Boston levated Railway to its men is deoted to the question of spreads. The ur previous bulletins of the comany to its men cover principally the uestions of earnings and expenses of e property for the previous months.

The question of spread came up on e property through a legislative bill ater abandoned) calling for eight ours in ten. The Boston Elevated hedules are made up on the eightour basis, but under the "cover" sysm, as described by Mr. Dana in an rticle on page 647 of the issue of this aper for Oct. 2, 1920.

The text of the March bulletin is eproduced below with the diagram hich accompanied it:

> Operation during the month of February esulted in income exceeding expenses by ,887.29.
>
> The severe storm of the twentieth made e problem more difficult but will in no ay affect our determination to meet the itstanding deficit by July 1, 1921.
>
> The present working conditions on this railay are probably not equalled on any railay in this country. In view of the fact at an 8 in 10-hour law has been sugested it is of value to study its effect upon he problem of providing street railway ransportation.

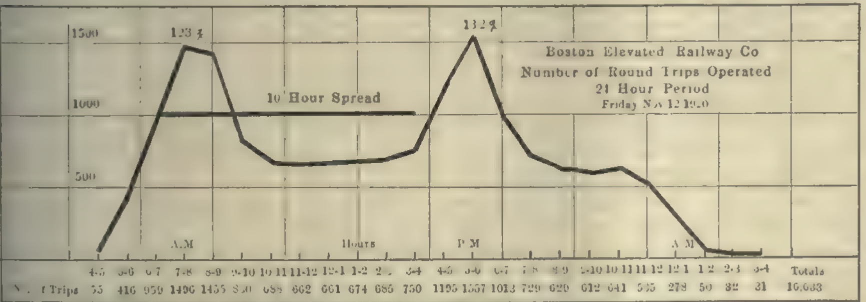

DIAGRAM IN CIRCULAR ISSUED BY BOSTON ELEVATED

> The accompanying diagram shows the umber of trips operated on this system uring each hour of the day.
>
> At the present time car service men comlete their work with outside hours as ollows:
>
> 7% within 8 hours
> 3% within 9 hours
> 8% within 10 hours
> 1% within 11 hours
> 78% within 12 hours
> 88% within 13 hours
> 100% within 14 hours
>
> This arrangement, in addition to an ight-hour guarantee which amounts to time ot actually required in service, to $600,000 er year, permits all trips being arranged n runs, and the small per cent required to over both rush hour peaks meets the servce requirements of our business.
>
> The line drawn across the chart repesents a ten-hour spread and indicates learly that men operating morning rush our trips would not be available for afteroon rush hour trips, and consequently ore men would be required.
>
> It would require 1,300 more men to oprate the system under such a restriction f outside time, and cost the car riders ver two millions of dollars.
>
> If the eight-hour guarantee remained nder such a plan the new men could only e of actual service one-fourth of their ime, and the balance of the time would onstitute a heavy burden upon the car iders.
>
> If the guarantee were not continued men who could only secure one-fourth of a day's work could not be held in the service, and a constant change of personnel would occur, which would likewise be a severe burden upon the car riders.
>
> We are co-operating in the common interests of the car riders, and ought to be familiar with facts such as these.
>
> Co-operation means securing all the revenue, avoiding accidents, being considerate of car riders, helping one another, conserving supplies and materials and not wasting time.

Eight-Cent Rate Temporary Solution

The existing rate of fare in the District of Columbia—8 cents, or four tokens for 30 cents—was ordered continued until Aug. 31 by the Public Utilities Commission in an opinion handed down on March 28. Efforts have been made to secure a reduction in the rate of fare. The Capital Traction Company did not ask for a continuation of the existing fare, but stated that a return to the 5-cent fare would not allow it a fair return. It was shown, evidently to the satisfaction of the commission, that the Washington Railway & Electric Company could not secure a proper return on less than the existing rate.

The commission apparently hopes Congress will pass the necessary legislation to permit the merging into a single organization of the two traction companies and the Potomac Electric Power Company.

Extraordinary Service and Extraordinary Mayor

In announcing his candidacy for renomination to the office he has filled for the last three years Mayor Charles R. Hunter of Terre Haute, Ind., told of things accomplished during his term of office. Among these points was the following:

> The traction company did its part toward making the necessary repairs along the line of its tracks, except for a strip along Wabash Avenue, which will be attended to this spring. * * * Although our people may not realize it we have as good a street car system as there is to be found in the country, and in the face of raising of fares all over the country our people ride at 5 cents. In other cities the fare has been advanced to 7, 8, 9 and 10 cents. Our people save thousands of dollars every year on fares alone.

Twenty per Cent Advance

Utah Road Allowed New Rates, but Refused Return on Appreciation in Value

One-way passenger fares on the Salt Lake & Utah Railroad, the "Orem Road," between Salt Lake City and Payson, Utah, are permitted to be increased 20 per cent by the Public Utilities Commission of Utah in a decision handed down on March 18.

COMMUTATION NOT INCREASED

Round-trip tickets, for which a 20 per cent increase was asked, are permitted to be increased 1.8 per cent of one-way fare. One thousand mile books are increased from 2¼ cents to 2½ cents a mile. No increase is allowed in 500-mile books, commutation tickets or school tickets. The application of the company was filed on Nov. 24, 1920. In it the company asked for a flat increase of 20 per cent on all its rates.

The Orem line at the hearing set up that its actual construction costs, incurred from 1913 to 1917, showed a book value of the property of $4,823,096. It sought to capitalize appreciations in value which have occurred during the war period. These, it was claimed, would enhance the value of the road by approximately 75 per cent, or $3,239,675. The company further sought to include in its investment $1,300,864 as "developmental cost," thus asserting the right to a fair return on a total cost of $9,363,635, as compared with the book value of the property of considerably less than $5,000,000.

WAR TIME VALUATION NOT ACCEPTED

These claims of the company the commission dismissed with the following comment:

> The commission is not inclined to accept in full a valuation based upon the maxims of war prices applied to property that was constructed and placed in operation before the war prices took effect. This is not intended to exclude consideration of such prices. On the contrary present reproduction cost undoubtedly is one element entering into the present fair value of property, but it is only one element and not necessarily controlling.
>
> Nor does the commission, in passing upon the question here involved, accept at this time as final the statement of book values presented by the petitioner as hereinbefore referred to. Such reference to the figures as has been made is intended merely to indicate that the financial condition of the petitioner is such that under this petition and for the purpose of passing upon the question involved it is not necessary to enter minutely into a consideration of the construction costs.

It was shown that the company had been unable to set up any depreciation reserve for the reason that the net income has not been sufficient to provide for depreciation on all of the property, and that heavy maintenance demands must be met by the railroad company within the next few years from current revenue.

Calculated on the 1920 volume of business it is estimated by the commission that the advances granted will increase the gross revenue of the company by $6,000 a month. This is a sum about 20 per cent less than the increase asked by the railroad in its petition.

Electric and Steam Lines Before I. C. C.

Common Issue Made by Railroads in Missouri and Kansas to Prevent Rate Discriminations

The Joplin & Pittsburg Railway, the Kansas City, Kaw Valley & Western Railway and the Arkansas Valley Interurban Railway have asked the Interstate Commerce Commission to adjust their intrastate rates to the interstate basis, and to join the electric road interests with those of steam railroads now pending before the commission. The cases were heard before an examiner of the Interstate Commerce Commission at Topeka on March 24. There will be a final hearing at Washington during April.

IN the case now coming from Kansas careful preparation has been made to establish all the facts in such a way that the analogy between electric and steam road circumstances may be plain. The situation has vital interest for the several electric railways in the Kansas City district, since neither the Missouri nor the Kansas State Commission has raised intrastate steam road rates to coincide with interstate rates fixed by the Interstate Commission.

PARALLELS STEAM RAILWAY CASE

The fact that Clyde Taylor, who prepared the present case for the Joplin & Pittsburg Railway, is also representing the Kansas City, Kaw Valley & Western Railway, has provided a valuable element in the construction of principles of interstate service by electric interurbans. The lines and service of the former are largely interstate; while the lines of the latter are intrastate, but its service largely interstate.

The third party to the present proceedings is the Arkansas Valley Interurban Railway, operating electric lines serving Wichita, Newton and Hutchinson, all within the State of Kansas.

The proceedings relative to the petition of the Joplin & Pittsburg Railway offer the broadest picture of the claim of electric roads to Interstate Commerce Commission intervention. This company operates 104 miles of standard gage road, the chief terminals being Joplin, in Missouri, and Pittsburg, in Kansas. It transports freight and passengers both in state and interstate commerce, files its tariffs with the state and federal commissions, has joint tariffs with the principal trunk lines, competes in both interstate and intrastate passenger and freight business with the Frisco, Southern, Missouri Pacific and Katy railroads. Its situation is therefore exactly the same as that of steam railroads whose intrastate rates, when discriminatory, the Interstate Commerce Commission adjusts in view of interstate rates.

The passenger rate of this company, in Kansas, was increased on March 4, 1920, to 3 cents per mile, and in Missouri was increased on Aug. 1, 1920, to 3 cents per mile. On Sept. 24, 1920, the company filed a passenger rate schedule of 3.6 cents per mile on interstate traffic with the Interstate Commerce Commission, and collected this rate on interstate passenger traffic thereafter. The present proceedings pertain chiefly to passenger rates, but the freight rate discriminations are also displayed. On Aug. 26, 1920, the interstate freight rates were advanced on this road 35 per cent, and on Nov. 1, 1920, the Kansas freight rate advanced 30 per cent.

When the time came to seek the intervention of the Interstate Commerce Commission concerning readjustment of state rates, it was necessary to show (1) that the intrastate rates were discriminatory, and (2) that the interstate rates, the higher, were reasonable.

The electric line's passenger rate of 3.6 cents was the result of a schedule without hearing upon its reasonableness and hence it did not constitute *prima facie* evidence that the interstate rate was reasonable. While it might appear upon the face of the evidence, therefore, that there was discrimination because of different intrastate and interstate rates, there was need to show definitely that the adverse discrimination was due to inequity of the state rates.

ROAD'S VALUATION STUDIED

The first steps in the present matter, therefore, were similar to those in rate hearings. Before the examiner in Topeka, were brought reports and evidences of the road's valuation, costs of operation and earnings. The low net earnings under the 3-cent intrastate rates were demonstrated, and the increase of earnings on interstate business under the higher interstate rate were also shown. The displays demonstrated that over the period during which the 3.6-cent interstate rates prevailed, the company's net earnings on interstate passenger business were small—much below fair return on approved valuation.

It was shown also that had the rates within Kansas and Missouri been equal to interstate rates during the whole period the returns net, would have been inadequate—assuming that the higher rate would not have reduced patronage. This evidence demonstrated the fairness and indeed the necessity of a 3.6-cent rate for intra and interstate traffic, and directly upheld the premise that the 3.6 interstate rate was reasonable. The evidence as to discrimination, therefore, put the burden of the discrimination on the unjustly low state rate. Many instances were advanced to show discrimination. Mr. Taylor proved that not only does the difference between the intrastate and interstate passenger rates cause discrimination against interstate business, but it enables the actual interstate passenger to defeat, in part, the interstate rate.

The electric railways are, in the
proceedings, coming before the Inte
state Commerce Commission on exact
the same footing as steam roads. I
deed, the whole subject now is present
as one matter, the electric and t
steam lines being associated in t
presentation. Attorneys for the t
classes of transportation are
operating and jointly preparing t
cases and the issues are joined befo
the commission in the effort to secu
a needed adjustment of rates for ra
roads, whether electric or steam,
cases where discrimination exists a
is shown to exist. The proceedings a
entitled "in the discrimination of Ka
sas intrastate passenger and freig
rates and charges as against intersta
rates and charges," I. C. C. No. 1191

Fare Increase Suspended

New Jersey Road Must Quit Unle
Adequate Relief Is Secured Through
Increased Rates

Proposed collection of 10-cent far
in 142 municipalities in which the Pu
lic Service Railway operates in Ne
Jersey was suspended on March 29, f
a further period of three months by t
new Public Utility Commission. Th
action was taken after Thomas N. M
Carter, president of the Public Servi
Corporation, had testified before t
commission that unless adequate reli
is provided by increased revenues t
Public Service Railway must go o
of business. Mr. McCarter said:

> Public Service Railway would have be
> in the hands of a receiver long ago b
> for the fact that its stock is held by Publ
> Service Corporation, which has been pa
> ing its deficit and keeping it alive. At t
> end of last year when the railway pr
> sented its application for increased rate
> the situation had become most acute. T
> company's funds and credit had been e
> hausted and Public Service Corporation,
> justice to its other underlying compani
> (Public Service Gas and Public Servi
> Electric) was no longer in position "
> hold the bag."

When the hearing began on Marc
29 Governor Edwards had not y
signed the bill passed the night befor
in the Senate giving the new commi
sion power to suspend increased rate
for a further period of three month
Therefore, the board was confronted b
the alternative of terminating the hea
ing within three days or permitting th
increase to become effective automati
ally. Governor Edwards, howeve
signed the bill during the afternoo
whereupon the board continued th
previous order of suspension, which ex
pired on April 1, and adjourned th
hearing until April 7 when it will b
resumed in Newark.

Mr. McCarter was the only witnes
examined. He said the actual loss sus
tained by the railway, during the las
three years, including the shortage i
the depreciation account fixed by th
board, amounted to $3,700,000. H
contended that instead of allowin
$800,000 a year for depreciation th
amount should be not less than $1,200,
000. The company, he said, should ex
pend immediately $2,000,000, represent
ing the accrued shortage in its renewa

count plus the whole sum allowed r depreciation for the present year.'

Public Service Railway, Mr. Mc- arter said, carried 363,000,000 cash ying passengers last year. He estiated that with a 10-cent fare this mber would be decreased by 50,000,- 0 during the present year.

As estimated by Mr. McCarter the st of operation for 1921, including ,200,000 for current amortization and 00,000 in part payment of the short- e in depreciation, will amount to $30,- 0,000. He estimated that a 10-cent re will yield a revenue of $31,000,000. e explained that experience has shown 40 per cent increase in rates results a 15 per cent increase in revenue due the fact that rate increases decrease e number of riders.

With jitney competition eliminated r. McCarter thought it would be possi- e to exist with a 10-cent fare for sual riders, including a free transfer, d an 8½-cent ticket fare.

Mr. McCarter said that since 1917 ages have increased from $6,250,000 $13,500,000; the cost of coal from .50 to $8.25 a ton delivered at the wer station; taxes were raised $2,- 0,000 last year with a further increase prospect, and steel rails have practic- y doubled in price. These four big ems, he said, tell the story.

One-Man Cars in Syracuse and Utica

One-man cars have been adopted for e by the New York State Railways its Utica and Syracuse lines as a trenchment policy, pending the grant- g of a fare increase by the Public Ser- e Commission, for both cities. The e-man operation has been adopted on verse types of cars, the first attempt change the system being made on e Blandina Street line in Utica, a ht traffic line, where single-truck cars d always been used. The single- ck cars were continued in operation, ssengers entering by the front door d paying fares upon entrance.

Finding that this policy was success- l and met with the co-operation of e public the South Street and Eagle reet lines in Utica were changed to e-man operation. Peter Witt model d J. G. Brill pay-as-you-enter type rs were used on these lines, passen- rs entering by the front door only.

In Utica passengers outbound from e downtown districts, pay as they ve while passengers inbound pay as ey enter. Thus far such a policy has t with success. B. N. Tilton, vice- esident and general manager of the ncern, states that the one-man cars ve been put on to stay.

In Syracuse the one-man cars were troduced on the Green Street line, a ute lightly patronized where single- ck cars are operated. Five of the racuse city lines are designated for rly conversion into one-man type rvice cars. Several of the lines are be consolidated while one will be -routed to make a shorter route in sponse to the petitions of patrons.

Transportation News Notes

New Transfer System Postponed.—The new transfer system on the Los Angeles (Cal.) Railway planned to be put into effect on April 3 has been postponed until May 1. The details of the transfer scheme were given in the ELECTRIC RAILWAY JOURNAL issue of March 19.

Needs Increased Fares.—The Southern Pacific Company has filed application with the Public Service Commission for permission to increase fares on its Oregon lines in the cities of Salem, Eugene, Springfield and West Linn. Advances sufficient to yield a 7 per cent return on the investment are asked.

Wants Seven Cents a Zone.—The Frankford, Tacony & Holmesburg Railway, Philadelphia, at a recent hearing before Public Service Commissioner Clement, petitioned for a 7-cent zone fare. The company alleges that it will not be able to continue service between Frankford and Torresdale unless a fare increase is permitted.

Complaint Against Six-Cent Fare Dismissed.—The Public Service Commission at Harrisburg has established a valuation of $1,300,000 for the properties of the Shamokin & Mount Carmel Transit Company, which operates in Mount Carmel, Pa., and has dismissed complaints against a 6-cent fare established in 1918. Subsequently the War Labor Board allowed a 7-cent fare.

Fare Rise Suspended.—The Public Service Commission has suspended until July 16 the 10-cent fare schedule sought by the St. Joseph Railway, Light & Power Company, St. Joseph, Mo. The advance was to have gone into effect on March 18. The present rate of two fares for 13 cents will remain in force unless in the meantime the commission should decide favorably on the railway's application.

Jitneys Barred Outside City.—As a result of a new law passed in the recent Legislature no stage lines or jitneys can be operated outside the city of Spokane, Wash., without a certificate of necessity issued by the State Public Service Commission. Stage lines now in operation within the city are not included in the new ruling. Jitneys were ruled off the streets of Spokane almost three years ago.

Jitney Business Thrives.—During the past few months several jitney buses have started operating along the principal streets in Evansville, Ind. For several years there was only one bus in the city. It was run from Main Street to Washington Avenue. Now in addition to the regular jitneys several buses meet the factory workers and haul them to their homes. The large number of jitneys now in operation is due largely to the fact that so many men out of employment find this a way of making a fair living.

Fare Increase Suspended.—The Board of Public Utility Commission has notified the Trenton & Mercer County Traction Corporation, Trenton, N. J., that it cannot put the proposed 10-cent fare into effect until May 28, unless the board in the meantime favorably disposes of the company's application, which has been pending since November. This company will make application to the Supreme Court for a review of the suspension order and the judicial determination of the right of the utility board to grant a suspension for six months.

Council Rejects Six-Cent Fare.—The City Council of Akron, Ohio, has denied the petition of the Northern Ohio Traction & Light Company for a flat 6-cent cash fare. The traction company forwarded a communication to the Council recently stating that it was losing money on a 5-cent fare, the rate now in effect on the city lines. The emergency 5-cent cash fare ordinance passed by the Council expires on April 1. The company has indicated it wants a 7-cent cash fare from April 1 until a new franchise for the city lines is passed by the council and accepted by the company.

Non-Stop Interurban Service Advertised.—The Puget Sound Electric Railway, operating an electric interurban between Seattle and Tacoma, Wash., has undertaken a campaign of advertising in both Seattle and Tacoma daily newspapers, calling attention to the "Interurban Flier," non-stop between the two cities, starting on March 21, with round-trip fare of $1. The advertisements urge that shoppers in both cities watch the daily advertising of merchants in the local papers, and plan their purchases accordingly. The company is making a strong effort to build up this "Shoppers' Special Train," and to increase traffic between the two cities.

Power Rates Too High.—At a recent hearing on the Dallas Railway's application for a 7-cent fare it was brought out that the railway would have made more than its 7 per cent return during the last six months of 1920 if fuel oil had been bought at its present price of $1.50 a bbl. In connection with its power rates the Board of Commissioners has requested the Dallas Power & Light Company to appear at a meeting to consider power rates now in effect and the proposed new schedule which the light company has declared it will charge the Dallas Railway in the future. The Mayor has requested a full expense report from the railway showing what return the company probably will make in 1921 on a 6-cent fare and what return on a 7-cent fare. He has said that everything will be done to expedite the hearings of both utilities so that the city may reach a decision in the near future.

Personal Mention

J. P. Pulliam, President

Railway Executive Chosen to Head Wisconsin Electrical Association for Ensuing Year

J. P. Pulliam, who for several years has served as secretary of the Wisconsin Electrical Association, was elected president at the annual meeting in Milwaukee on March 24. Mr. Pulliam takes the place of W. C. Lounsbury, general manager of the Superior Water, Light & Power Company, Superior, Wis. Mr. Pulliam is vice-president of the Wisconsin Public Service Company, of the Evanston (Ill.) Railway, and vice-president and general manager of the Wisconsin Railway, Light & Power Company.

Mr. Pulliam became connected with the electric railway field after a number of years' experience in steam railway work with the Louisville Southern Railway at Louisville, Ky., and with the Choctaw & Oklahoma Railway Company at Shawnee, Okla. Later he engaged in commercial pursuits for a year and then served as trainmaster for the Grand Rapids, Grand Haven & Muskegon Railway for three years. He left that company to become superintendent of the Winnebago Traction Company, Oshkosh, Wis.

When the Wisconsin Electric Railway purchased the Winnebago Traction Company in 1908 Mr. Pulliam served the former company and the Eastern Wisconsin Railway & Light Company as general superintendent. He was later given a similar position with the same company in Fond du Lac, Wis. In 1917 he was elected vice-president and placed in charge of the operation of the Wisconsin Public Service Company, continuing in this position to date.

John Whitsell Assumes Managership of Winnipeg Railway

John Whitsell, whose appointment as operating manager of the Winnipeg (Man.) Electric Railway was announced in the ELECTRIC RAILWAY JOURNAL a short time ago, assumed his new duties on March 15.

He began his career in the electric railway industry in 1891 when he entered the car service department of the Sioux City Traction Company, Iowa, now known as the Sioux City Service Company. In 1897 Mr. Whitsell went to work for the Suburban Railroad, Chicago, as a shopman, later advancing to master mechanic, and then to superintendent in 1900. In 1912 he became superintendent of equipment and general superintendent of transportation of the County Traction Company, Chicago, which, the following year, was combined with the Suburban Railroad to make the Chicago & West Towns Railway, of which he became general superintendent. In May, 1920, he was made general superintendent of the Chicago & Interurban Traction Company, which position he left to go to Winnipeg.

V. B. Phillips, Consultant

Assistant to Vice-President of Cleveland Railways Joins Mr. Crecelius in Engineering Firm

Victor B. Phillips has resigned as assistant to the vice-president and as acting superintendent of power of the Cleveland (Ohio) Railway to become associated with L. P. Crecelius in the firm of Crecelius & Phillips, consulting, constructing and operating engineers. The resignation of Mr. Crecelius as superintendent of power of the Cleveland Railways was announced in these columns on Jan. 22.

V. B. PHILLIPS

Mr. Phillips has been associated with the Cleveland Railway since 1911. He is a graduate of Cornell University with the degree of mechanical engineer.

Immediately after the outbreak of the war Mr. Phillips joined the army and served with the rank of captain in the 113th Engineers. After the armistice he was attached to the American Commission to negotiate peace, first in connection with the valuation of war damages, and later with Bernard M. Baruch, economic adviser to the commission. From April to September, 1919, Mr. Phillips served with the United States Liquidation Commission in Paris and had charge of disposing of surplus army stocks.

At the present time he is serving as expert on the American Committee on Electrolysis and is a member of the engineering executive committee of the National Safety Council. Papers and articles by Mr. Phillips on electric railway and power subjects have appeared frequently in society transactions and in the technical journals.

The firm of Crecelius & Phillips will engage in general engineering practice. At the present time the firm is acting as engineers for several electric railway and public utility companies.

Promotions on Interurban

H. G. Hardin Made Superintendent and H. A. Otis His Assistant on Chicago Road

Harry G. Hardin and Harold A. Otis have been appointed general superintendent and assistant general superintendent, respectively, of the Chicago & Interurban Traction Company, Chicago, upon the order of Britton I. Budd, president of the company. Mr. Hardin has been with the elevated railways in Chicago for nearly twenty years, having begun this service on Oct. 4, 1901, as a trainman with the Metropolitan West Side Elevated Railway. During the following ten years he worked up through the train and yard service and in 1911 was appointed superintendent of transportation of the Chicago & Oak Park Elevated Railroad. He served in this capacity until April, 1920, when he was brought into the main office of the elevated companies as an assistant to M. J. Feron, general superintendent of transportation. He served in this office until his recent appointment in immediate charge of the Chicago & Interurban Traction Company, an interurban line connecting Chicago with Kankakee, Ill.

Mr. Otis began his work with the railways as a night electrician for the South Side Elevated Railroad after his graduation in 1912 from the electrical engineering department of the University of Illinois. In September of that year he was transferred to the office of superintendent of equipment of the several elevated railways. He has been engaged in the engineering and operating department since that time, his jurisdiction in mechanical matters having been extended lately to include the Chicago-Kankakee interurban.

N. H. Brown Resigns from New Orleans Railways

Nelson H. Brown, superintendent of transportation of the New Orleans Railway & Light Company, New Orleans, La., has resigned and A. B. Paterson has been appointed acting general superintendent in his stead. Mr. Paterson comes from Meridian, Miss., and became identified with the New Orleans Railway & Light Company last July as special engineer for General Manager A. L. Kempster. He was formerly with the Henry L. Doherty interests and has had about seventeen years' experience in the public utility business.

Mr. Brown went to New Orleans from Buffalo, where he was general superintendent of the International Railway. He has had an extensive experience in railway service, having been connected previously with the street railways of Syracuse, Worcester and Albany.

H. M. Platt has recently been appointed editor of the N. E. L. A. *Bulletin* and assistant to the director of publicity. Mr. Platt was at one time on the editorial staff of the ELECTRIC RAILWAY JOURNAL, having previously been in the business department of the McGraw Publishing Company as a field representative on several of its publications.

F. E. Schornstein, formerly local manager at Red Wood, Minn., of the Wisconsin-Minnesota Light & Power Company, has been made district manager for the same company at Eau Claire, Wis., in charge of the local street railway system in Eau Claire and Chippawa Falls and the interurban line connecting these two cities and Altoona.

V. Chisholm has resigned his position as superintendent of the railway department of the Knox County Electric Company, Rockland, Me., after having served thirty years in the railway department of that company. Charles E. Gregory, who has been in charge of the operation of the power station equipment at Rockland for several years, has been appointed to fill the vacancy. Mr. Gregory will have full charge of the railway department and power station equipment.

R. L. Ellis has been appointed manager of the Miami Beach Electric Company's new $250,000 plant which furnishes Miami Beach, Fla., with its light, and power for both industrial and railway use. Mr. Ellis was formerly with the Birmingham Railway, Light & Power Company, Birmingham, Ala., and previous to that was connected with the Selma (Ala.) Electric Railway Company. After making a complete survey of the transportation situation, Mr. Ellis has recommended a ten-minute schedule between Miami and Miami Beach and has taken steps toward the procuring of additional rolling stock to permit maintaining that schedule and building up adequate and efficient service.

Benjamin F. Cleaves, chairman of the Maine Public Utilities Commission since its establishment in 1914, has tendered his resignation to take up the management of the Associated Industries of Maine, with headquarters at Augusta. Chairman Cleaves is a native of Waterboro, Me., and was graduated from the Biddeford High School in 1885. He read law in the offices of Hamilton & Haley, was admitted to the bar in 1892, and practiced law at Biddeford thenceforth, ultimately becoming a member of the firm of Cleaves, Waterhouse & Emery. With the establishment of the Maine commission he sought to create an understanding between the utilities, the public and the commission which was peculiarly adapted to the conditions prevalent in Maine and which has borne fruit in a regulation of marked breadth of view, straightforward action and a sane and sympathetic realization of the problems of public utility service and financing.

Statue to Railway Founder

Permanent Memorial Erected in Minneapolis to Founder of Present Twin City Rapid Transit Company

Few electric railway men who knew Thomas Lowry of Minneapolis, Minn., and cherish recollections of him are perhaps acquainted with the fact that a monument by Karl Bitter has been erected to the memory of the founder of the Twin City Rapid Transit Company. The bronze statue stands in Virginia Triangle, Minneapolis, at the intersection of Hennepin and Lyndale Avenues. It was unveiled on Aug. 18, 1915, and presented to the city by the Lowry Memorial Association, formed among Mr. Lowry's friends and associates shortly after his death on Feb. 4, 1909.

"Tom" Lowry was born Feb. 27, 1843, on a farm in Logan County, Ill. He was admitted to the bar in 1867. The same year he opened a law office in Minneapolis and a few years later was made judge of the Hennepin County Court of Common Pleas. After the panic of 1873 Mr. Lowry turned his attention to the struggling street railway in Minneapolis, with which he was afterward continuously connected, at first as vice-president and later, when the systems in Minneapolis and St. Paul were consolidated, as president. In the early days of the American Electric Railway Association Mr. Lowry took a very active interest in its affairs and in 1890 was elected president of the association.

He was very popular, especially in the Twin Cities. One of the newspapers in eulogy of Mr. Lowry said editorially: "No man envied his wealth, for it was well earned and well spent. If for nothing else, he was remarkable for making his traction company the most popular institution in two great cities. To this his own unaffected modesty and high personal character largely contributed."

The accompanying illustration of the memorial is published through the courtesy of the Minneapolis *Journal.*

MEMORIAL TO "TOM" LOWRY, FOUNDER OF TWIN CITY RAPID TRANSIT

Obituary

J. B. Robbins, at one time superintendent of the Chattanooga Railway & Light Company, Chattanooga, Tenn., died on March 16 in St. Paul, Minn. Mr. Robbins began business as a railroad contractor. He was also a business associate of the late C. G. Goodrich, president of the Twin City Rapid Transit Company. Mr. Robbins was born in Kentucky in 1862.

Benjamin B. Lawrence, mining engineer and a director of the Washington Water Power Company, Spokane, Wash., and of other corporations, is dead. Mr. Lawrence was graduated from the School of Mines, Columbia University, in 1878. He went West and engaged in gold and silver mining in the Gilpin district of Colorado. Returning to New York he established an office as a consulting engineer.

Samuel T. Murdock of Indianapolis, who has been prominent in the promotion of Indiana's traction lines, died on March 21 after a week's illness. Mr. Murdock was secretary of both the Chicago, South Bend & Northern Indiana Railway and the Southern Michigan Railway, South Bend, Ind. He was also interested in the Union Traction Company of Indiana, Anderson, and had been recently named as a director of that company. Mr. Murdock was fifty-three years old.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER.
SALESMAN AND PURCHASING AGENT
ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Good Supply of Track Bolts, Nuts and Spikes

Prices Are from Twenty to Forty per Cent Below Peak—Buying Mostly for Repairs

Producers of railroad spikes, bolts and nuts have accumulated a reasonable reserve supply sufficient to make deliveries of all standard material from stock, but there is a growing tendency to curtail production. This is natural in view of the light demand, and large jobbers who sell to railroads are also keeping their supplies down as low as they consistently can. Although there seems to be nothing tangible on which to base expectations of still greater price declines in this line producers report that consumers are apparently entertaining such hopes. The reduction from peak prices of spikes and bolts to date has been considerable, ranging from about 20 to 40 per cent with different companies, and in a representative instance amounting to $12 to $15 a ton on spikes and $20 to $30 per ton on bolts and nuts.

Producers are of course hopeful of improvement in demand, though they see few signs of it in the present market. Steam railroads last fall gave every indication of heavy buying of track material this spring and in fact did enter the market in fair volume the first of the year. This buying came nearly all at one time, however, and then petered out. For the past six weeks there has been very little activity either in the foreign or domestic field, and to date there is not much indication that railways will do more than repair roadbeds this year.

The current base price of track bolts and nuts is about 5 cents in car lots and 6 cents in lesser quantities, while standard railroad spikes are 3.65 cents and 4.65 cents by the same differentiation.

Immediate Deliveries of Track Tools

Manufacturers Differ Over Prospect for Demand Improving—Stocks Held to Low Levels

In view of present market conditions both manufacturers and jobbers of track tools such as picks, shovels, etc., report that they are keeping stocks low. Some companies, however, still have a considerable supply of high-priced goods on their hands on which it has been necessary to take a loss. In general immediate deliveries are made. The reduction from peak prices reported by different producers ranges from 10 to 30 per cent, though for some time the market has held steady. There seems to be some feeling of uneasiness in the trade regarding steel quotations, and the possibility of lower prices is perhaps a contributing factor in keeping both stocks and buying at low levels.

Some producers are optimistic over a return of fairly good business before the year is out, others are not. On the one hand it is pointed out that through such factors as the payment of money owed by the government to steam roads, the inauguration of wage cuts and higher rates for many electric lines, some hope of improvement is offered. On the other hand, it is stated that railways in general apparently have no money, that steam roads have in large part already expended the pa ments that are anticipated from t government and that the last half the year will be too late for manufa turers in this line to receive go orders.

Thus far in 1921 it seems that t railroads of the country, both stea and electric, are going to buy only su track tools as are actually needed f necessary repairs, and even these light volume. The foreign market off, too, though there is quite a stro demand reported from South Ameri and a large potential demand u doubtedly exists in Europe. Exchan rates are prohibitive as they affect t placing of orders in this country, ho ever, and foreign competition is kee

Justification of Present Prices Up to Manufacturer Say Railways

Reduction of Prices Would Stimulate Buying, Is General View— Willingness of Producers to Take Losses on Stocks of High-Priced Material Is Questioned

Since the views of representative manufacturers of electric railway equipment on the subject of prices were published in the issues of Feb. 5 and 12, a number of letters have been received from electric railway officials. These letters differ with some of the points that producers make and present new evidence, in addition to that contained in the Feb. 26 number, as to how traction companies generally regard the question of price reductions on electric railway material.

The general tenor of the replies of the electric railways that were heard from appears to be that the burden of proof should rest upon the manufacturer as to why greater reductions in price are not made. There is also a decided feeling in many cases that prices of railway material are still out of line with lowered costs. Such items as steel, ties, wheels, track material, paints and varnish, overhead material, air and electrical car equipment, power station and substation equipment are among the things that are specifically mentioned.

Unwillingness of some manufacturers to take losses upon stocks of high-priced material is mentioned by more than one electric railway as the cause of prices being maintained. An official of a representative Middle-Western traction company believes that manufacturers in this field made large profits during the period of rising prices and now, if well organized, should be able to take some losses. This is the only way to relieve the present stagnated condition of the market, he thinks. purchasing agent for another proper corroborates this view and states th electric railways are trying to place near normal orders as they can whe manufacturers have shown a willin ness to take losses the same as has be done in other industries. Where pr ducers have held out for prevailing hi prices, however, this company is follo ing a policy of curtailing purchases the lowest possible level commensura with absolute needs.

The practice of maintaining railw equipment prices where possible fin some defense from the president of electric railway in the East, howev This official believes in a policy buyer versus seller, and if a manufa turer is able to obtain business se no reason why prices should phila thropically be cut. He goes on to sa however, that some manufacturers a undoubtedly displaying poor judgme in not passing lowered costs on to t consumer as a means of increasi present low demand.

Manufacturers in general, as stat in previous issues, have question whether price cutting would stimula buying to any extent. The buying e of the industry is by no means agre over this point either, but judging reports received from several represe tative railway officials greater buyi would undoubtedly follow decided pri reductions.

These men report that extensions some instances are being held ba awaiting lowered costs, and that co umers would stock more goods instead buying from hand to mouth if prices eally represented a profitable investent.

The most common explanation fered by manufacturers for maintaing prices is that freight charges and bor costs preclude reductions. The urchasing department of a Western lectric railway disputes this view on e ground that freight charges are nimportant in the final price of most roducts and that labor cost, even where o reduction in wages has been made, now less, due to greater efficiency of orkmen.

Another important factor in prices railway material today is probably verhead expenses. In this connection e general manager of a large traction ompany in the north-central section oints out that the industry at present largely over-factoried because of artime expansion. Some of these facries must be closed down or converted other industries, he thinks, for to ontinue full operation means 100 per ent overhead on a limited output.

ictoria, Australia, Asks Tenders on Steel Poles and Copper Cable

Tenders are invited by the State lectricity Commission of Victoria, ustralia, for 600 steel poles for carying three, three-phase, 22,000-volt eeder cables and two metallic return elephone circuits, and for 250 miles of ard-drawn copper cable for the Morell power scheme. Copies of specication No. 47, covering the steel poles, nd specification No. 66, covering the opper cable, have been forwarded by . W. Ferrin, trade commissioner, and ave been placed on sale at the Bureau of Foreign and Domestic Commerce, district offices, 734 Custom House, New York City, and 1424 First National Bank Building, Chicago. Tenders must be received at the office of the Electricity Commission, Melbourne, Australia, by May 31, 1921.

South African Railways Request Bids

In connection with the forthcoming electrification of the Durban to Pietermaritzburg and Cape Town to Simons Town lines of the South African Government Railways, the High Commissioner for the Union of South Africa has invited tenders for rolling stock, electrical equipment, etc.

Copper Market Tending Higher

Steps leading to a further drastic cut in copper production have now been taken, and as a result several large mines have closed down entirely. This factor in the market, together with the firm price stand that has all along been taken by large producers, has brought about a decidedly firmer tone. Prices have advanced about ¼ cent since last week's report, and the minimum quotation for prompt delivery is now 12.50 cents. Large producers are still holding to prices of 12.75 to 13 cents per pound for copper delivered over the next two to three months and are reported to have made sales at these figures.

Consumers have apparently decided that nothing is to be gained by holding off longer from covering their needs, and as a result domestic buying interest is decidedly greater. Whether this is but a temporary condition it is, of course, yet too early to say. The most recent companies to suspend operations temporarily are the Anaconda, Utah, Ray, Chino and Nevada Consolidated copper mining companies.

Rolling Stock

The Androscoggin and Kennebec Railway Company, Lewiston, Me., is building in its own shops one 40-ft. steel underframe, motor, gravel flat car.

Brooklyn (N. Y.) Rapid Transit Company is considering with a number of car builders and the Safety Car Devices Company the adaptation of several hundred double-track cars on its surface lines to the safety car principle.

The Monmouth County Electric Company, Red Bank, N. J., has purchased four fifteen-bench, double-truck, open summer cars and six double-truck closed cars. The above rolling stock, it is announced, is not new but in first-class condition and will replace single-truck cars now in use.

Track and Roadway

British Columbia Electric Railway, Vancouver, B. C.—The British Columbia Electric Railway is planning to make an extension from Cloverdale to Blaine. An extension is also contemplated from Huntington, B. C., to Bellingham, Wash.

Denver (Col.) Tramway.—The Denver Tramway will begin improving its lines as a result of the recent fare advance. New steel rails will be laid

NEW YORK METAL MARKET PRICES

	Mar. 2, 1921	Mar. 30, 1921
opper ingots, cents per lb	12.50	12.75
opper wire base, cents per lb	15.25	15.00
ead, cents per lb	4.00	4.10
ickel, cents per lb	41.00	41.00
inc, cents per lb	5.10	5.15
in, cents per lb	29.37	29.37
luminum, 98 to 99 per cent, cents per lb	28.00	28.00

OLD METAL PRICES—NEW YORK

	Mar. 2, 1921	Mar 30, 1921
Heavy copper, cents per lb	10.25 to 10.50	9.50 to 10.25
Light copper, cents per lb	8.00 to 8.25	7.00 to 8.50
Heavy brass, cents per lb	6 00 to 6 50	5.50 to 5.75
Zinc, old scrap, cents per lb	3.00 to 3.12	2.87 to 3.00
Yellow brass, cents per lb	4.00 to 4.25	4.00 to 4.25
Lead, heavy, cents per lb	3.25 to 3.50	3.25 to 3.50
Steel car axles, Chicago, per net ton	16.50 to 17.00	14.50 to 15.00
Old car wheels, Chicago, per gross ton	18.00 to 18.50	13.50 to 14.00
Steel rails (short) Chicago, per gross ton	15.50 to 16.00	12.00 to 12.50
Steel rails (rerolling), Chicago, gross ton	15.00 to 15.50	12.00 to 12.50
Machine shop turnings, Chicago, net ton	6.50 to 7.00	5.50 to 3.00

ELECTRIC RAILWAY MATERIAL PRICES

	Mar. 2, 1921	Mar. 30, 1921
ubber-covered wire base, New York, cents per lb	16.50	16.50
eatherproof wire base, New York, cents per lb	17.50	17.50
tandard Bessemer Steel Rails, per gross ton	45.00	45.00
tandard open hearth rails, per gross ton	47.00	47.00
-rail, high (Shanghai), per gross ton, f.o.b. mill	.....	.....
ails, girder (grooved), per gross ton, f.o.b. mill	.....	.....
ire nails, Pittsburgh, cents per lb	3.10 to 3.25	3.00 to 3.25
ailroad spikes, drive, Pittsburgh base, cents per lb	3.65	3.65
ie plates (flat type), cents per lb	2.75	2.75
ie plates (brace type), cents per lb	2.75	2.75
ie rods, Pittsburgh base, cents per lb	6.00	6.00
ish plates, cents per lb	2 75	2.75
ngle bars, cents per lb	2.75	2.75
ail bolts and nuts, Pittsburgh base, cents per lb	5.50	5.00
teel bars, Pittsburgh, cents per lb	2.00 to 2.35	2.00 to 2.35
heet iron, black (24 gage), Pittsburgh, cents per lb	3.85 to 4.20	3.70 to 4.20
heet iron, galvanized (24 gage), Pittsburgh, cents per lb	4.80 to 5.25	4.55 to 5.25
alvanized barbed wire, Pittsburgh, cents per lb	3.85 to 4.10	3.85 to 4.10

	Mar. 2, 1921	Mar. 30, 1921
Galvanized wire, ordinary, Pittsburgh, cents per lb	3.70 to 3.95	3.70 tc 3.95
Car window glass (single strength), first three brackets, A quality, New York, discount*	77%	77%
Car window glass (single strength), first three brackets, B quality, New York, discount	77%	77%
Car window glass (double strength, all sizes, A quality), New York, discount	79%	79%
Waste, wool, cents per lb	11 to 17	11 to 17
Waste, cotton (100 lb. bale), cents per lb.		
White	9.00 to 14.00	9.00 tc 13.00
Colored	7.00 to 11.00	7.00 to 11.00
Asphalt, hot (150 tons minimum), per ton delivered	40.00	40.00
Asphalt, cold (150 tons minimum, pkgs. weighed in), per ton	36.00	36.00
Asphalt, filler, per ton	36.00	36.00
Cement, New York, per bbl	4.10	3.50
Linseed oil (raw, 5 bbl. lots), New York, per gal	.72 to .73	.68 to .70
Linseed oil (boiled, 5 bbl. lots), New York, per gal	.74 to .75	.70 to .72
White lead (100 lb. keg), New York, cents per lb	.13	.13
Turpentine (bbl. lots), New York, per gal.	.57 to .59	.54

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* These prices are f.o.b. works, with boxing charges extra.

on the Stout and Kalamath Street lines to replace several blocks of old track which will be torn up.

St. Petersburg (Fla.) Railway.—The St. Petersburg City Commission has ordered an election to be held on April 19 to vote on a bond issue of $260,000 of which $65,000 of bonds will be issued to build an extension of the street railway, which is municipally owned, out First Street and a loop around by First Avenue. Citizens have pledged to buy the bonds at par if they can't be marketed otherwise.

Evansville, Ind. — Benjamin Bosse, Mayor of Evansville, Ind., assured a delegation of more than 400 people at a hearing a few days ago of his assistance in getting an extension of the car lines through Howell, a suburb of Evansville. The matter has been referred to the railroad committee of the Evansville City Council for action.

Indiana Public Service Corporation, Fort Wayne, Ind.—R. M. Feustel, president of the Indiana Public Service Corporation in securing permission to double track the line on Pontiac Street to the city limits has answered the objection that the street is too narrow. Mr. Feustel has stated that Pontiac Street is the only through street south of the railroad along which the line could be built and though the pavement is narrow there are possibilities of widening it and making it the logical thoroughfare east of Calhoun Street and south of Creighton Avenue.

Power Houses, Shops and Buildings

United Railways, St. Louis, Mo.—The United Railways is planning the building of four electric plants at a cost of $285,000.

Omaha, Lincoln & Beatrice Railway, Lincoln, Neb.—The Omaha, Lincoln & Beatrice Railway has completed a concrete and steel carhouse and shops.

Alabama Power Company, Montgomery, Ala.—The Public Service Commission has granted a certificate of necessity for the construction of a large power unit near Lock 12 on the Coosa River to the Alabama Power Company. The company has also received permission for the construction of a transmission line from Roanoke to Lafayette and another from Auburn to Tuskegee.

Indiana Service Corporation, Fort Wayne, Ind.—Power for the street cars in Fort Wayne, Ind., will be supplied from a new substation to be erected by the Indiana Service Corporation at the corner of Melita and Webster Streets. The ground has been purchased and the preliminary work on the construction of the building is under way. The plant will be housed in a one-story brick building measuring 40 ft. by 80 ft. Motor generator sets will be removed from the company's main plant on Spy Run Avenue to the new station.

Laconia Street Railway, Laconia, New Hampshire.—The Laconia Street Railway expects within the next six months to purchase one 200-kw. synchronous motor-generator set.

Professional Notes

Louis T. Klauder has resigned as construction engineer of the Philadelphia Rapid Transit Company and has opened offices in the Pennsylvania Building, Philadelphia, as a consulting engineer specializing in power plant design and construction.

C. G. Young, consulting engineer, has organized the C. G. Young Company, Inc., to act as consulting engineers. The field of the new company will include, among other engineering work, that of the investigation and placing of new and fundamental inventions and processes, as well as to assist manufacturers to take on new lines of manufacture which would be of profit to them. Mr. Young's experience in domestic and foreign fields extends over thirty years, and a considerable part of this time he has been engaged in public utility engineering. The headquarters of the company will be at 501 Fifth Avenue.

Trade Notes

The Waterbury Battery Company, Waterbury, Conn., announces the election of E. E. Hudson as president and Francis T. Reeves, treasurer.

Austin Machinery Corporation, manufacturer of concrete mixing machines, etc., lost several buildings by fire at its Winthrop Harbor, Ill., plant on March 22. The damage will not in any way interfere with production and prompt delivery of its products, however, it is announced, as the company's plants at Muskegon, Mich., and Toledo, Ohio, are well equipped to care for customers.

Electrifying Rumanian Railroads.—The Bukarest government is considering the electrification of a number of its railroads. Large orders have already been placed in Germany, the Orenstein-Koppel Works alone having received orders to the amount of 90,000,000 marks. It is reported that additional orders will be placed in the near future.

Swedish Commission to Study Swiss Electrification.—Advices from Switzerland state that during the next few weeks a commission of foreign engineers will visit Switzerland for the purpose of studying the electrification of the Swiss railroads. The commission will be composed of three American and three Swedish engineers. Mr. Oefverholmen, the Director General of the Swedish State Railways, heads the commission. The foreign engineers will inspect the Gotthard and Lotshberg lines and the large new power stations on both of these lines.

The Refractories Manufacturers Association, at its annual meeting March 16 to 18, in New York, re-electec following officers: J. D. Ramsey, Fire Brick Company, St. Marys, president; J. L. Green, Laclede-Ch Clay Products Company, St. Louis, vice-president; C. C. Edmunds, Lain Fire Brick Company, Pittsb treasurer; F. W. Donahoe, 840 C Building, Pittsburgh, the associat executive offices, secretary; E. Durant of the Pacific Clay Pro Company, Los Angeles, Frank J. wig of the Standard Fire Brick pany, Pueblo, Col., and C. E. Kap of the Federal Refractories Comp Cleveland, were elected to the e tive committee.

The United States Rubber E Company, 1790 Broadway, New as distribution unit of the United S Rubber Company in foreign fields, new branches in process of being op in Batavia, Java, as the Dutch Indies branch, in Brussels, Belg and in Copenhagen, Denmark. A line of electrical conductors, insul friction tape and rubber splicing is to be carried in each branch, now carried in existing branche Havana, Rio de Janeiro, Montev Buenos Aires, Santiago de Chile, nila, London, Madrid and Johnan burg. Exclusive distributing arra ments are maintained in Mexico, ezuela, Porto Rico, Barbados, Colombia, Bolivia and India, w stocks are also carried.

New Advertising Literatur

Compressor. — The Griscom-Ru Company, 90 West St., New York has issued bulletin No. 350, descri the "G-R Regenerative Compresso

Portable Instruments.—The West house Electric and Manufacturing pany is distributing leaflet No. A describing its type PX portable ins ments for general testing purpose

Insulating Fabric. — A non-w fabric sheet and tape for insula purposes, "Voltape," has been veloped by the Res-Pro Industries, 209 Washington Street, Boston.

Indicators and Gages. — The B arach Industrial Instrument Comp Homewood Station, Pittsburgh, is tributing pamphlet M, covering its gine indicators (Maihak type). Bul G describes its "Easy Read" ma eters and gages.

Pump Governor. — Having acqu sole rights to manufacture and Ideal Pump Governors the Atlas Company, 282 South Street, New N. J. is now distributing its first letin, No. 1-A, edition No. 1, descri this governor.

Combustion Recorder.—Mono poration of America, New York has issued a bulletin describing "Duplex Mono," which simultaneo records on one diagram both the plus of air in process of combus and the degree of incomplete com tion.

Why your Safety Cars should have The Peacock Staffless Brake

The Peacock Staffless

s readily adaptable

to any condition—that is, to any size of car, any crowds, grades, conditions of traffic, etc. That is to say, having a gear ratio of 12 to 52, any BRAKING POWER can be obtained *by varying the size of the brake handwheel.* For instance, on the Peacock Staffless, 50 lbs. applied to a 20-in. wheel gives 1,333 lbs. braking power—50 lbs. on a 16-in. wheel gives 1,066 lbs. braking power—75 lbs. on a 20-in. wheel gives 2,000 lbs. braking power, and so forth. With the ordinary hand brake, 50 lbs. on a 20-in. wheel yields only 421 lbs. braking power! Yet the Peacock Staffless costs little if any more and weighs LESS. Consider these figures!

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The Dozen Peacock Reasons

1. Saves half the space of the ordinary hand brake.
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3. Gives three times the braking power for the same human power.
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11. Lower maintenance costs.
12. Greatest economy in the long run

Each advantage will be dealt with in future advertisements — or you may secure the whole story in full in Bulletin No. 10. A copy ?

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Denver, Colo. . First National Bank Building
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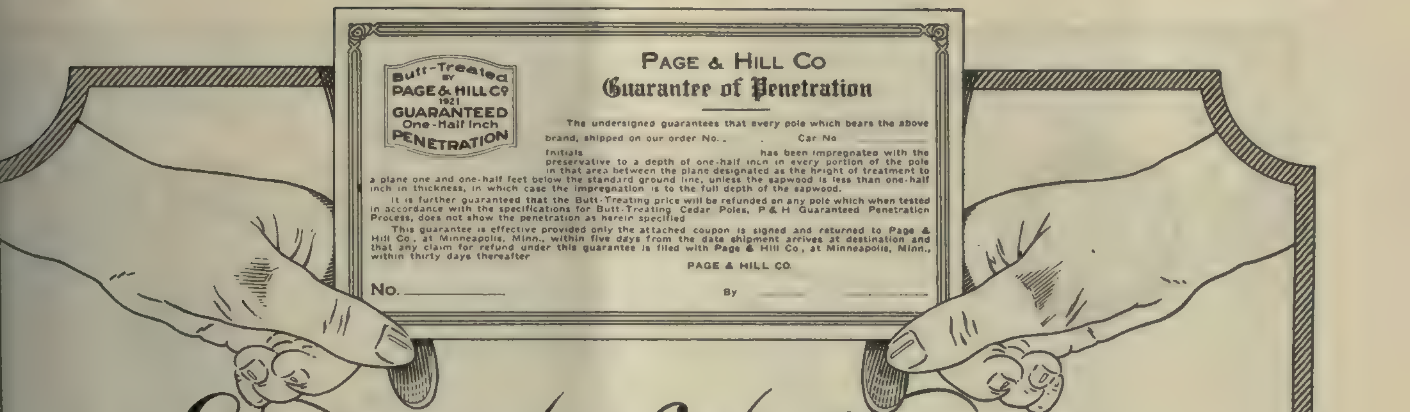

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PAGE & HILL CO

Guarantee of Penetration

The undersigned guarantees that every pole which bears the above brand, shipped on our order No. . . Car No ______ Initials has been impregnated with the preservative to a depth of one-half inch in every portion of the pole in that area between the plane designated as the height of treatment to a plane one and one-half feet below the standard ground line, unless the sapwood is less than one-half inch in thickness, in which case the impregnation is to the full depth of the sapwood.

It is further guaranteed that the Butt-Treating price will be refunded on any pole which when tested in accordance with the specifications for Butt-Treating Cedar Poles, P & H Guaranteed Penetration Process, does not show the penetration as herein specified

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PAGE & HILL CO

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With every shipment of poles butt-treated by this process the buyer receives a written guarantee. Page & Hill Co. guarantees without qualifications to refund the entire butt-treating price on every pole that does not show ½ inch uniform penetration.

Every pole buyer knows what a revolutionary departure this is from old methods, and what this guaranteed penetration process is going to mean in longer life for poles, in fewer replacements of poles, and in reduction of maintenance costs.

This guaranteed process, moreover, costs but little more in the first cost, and in the long run is far cheaper.

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1416 Starks Bldg., Louisville, Ky.

Originators of the P & H Guaranteed Penetration Process. Producers, manufacturers, and foremost in the Butt-Treatment of Cedar Poles.

Butt-Treated BY PAGE & HILL CO 1921 GUARANTEED One-Half Inch PENETRATION

This disc countersunk on the butt-end of every pole Butt-Treated by the P & H Guaranteed Penetration Process is your assurance of one-half inch penetration.

THE BABCOCK & WILCOX COMPANY
STEAM

THE BABCOCK & WILCOX CO.

85 LIBERTY ST., NEW YORK

The Babcock & Wilcox Co. is constantly endeavoring to improve the design, construction and operating qualities of its products. The Company believes in being conservative and in refraining from making changes until absolutely satisfied that its developments are sound from engineering, construction and operating viewpoints.

THE STIRLING BOILER

REDESIGNED, RECLASSIFIED, PATENTED

During the last fifteen years numerous changes have been made in the Stirling Boiler. In some instances these have been to meet special and unusual operating conditions, and others have been the result of improvements in details of design and construction. These changes have been carefully watched and proven under various and difficult conditions of operation. The advantages of many of them in service have been so marked that after years of experience and study these features have been incorporated in the redesigned Stirling Boiler.

The studies which have led to redesign have also led to a consideration of the variation between classes and sizes of Stirling Boilers. This has resulted in a reclassification of these boilers in which the variation between classes and sizes is simple, logical and progressive.

The redesigned and reclassified Stirling Boiler is now offered.

BRANCH OFFICES

Boston, 49 Federal Street
Philadelphia, North American Building
Pittsburgh, Farmers Deposit Bank Building
Cleveland, Guardian Building
Chicago, Marquette Building
Detroit, Ford Building
Cincinnati, Traction Building
Atlanta, Candler Building
Tucson, Ariz., 21 South Stone Avenue
New Orleans, 521-5 Baronne Street
Fort Worth, Tex., Flatiron Building
Denver, 435 Seventeenth Street
Salt Lake City, 705-6 Kearns Building
San Francisco, Sheldon Building
Los Angeles, 404-406 Central Building
Seattle, L. C. Smith Building
Havana, Cuba, Calle de Aguiar 104
Houston, Texas, Southern Pacific Building
San Juan, Porto Rico, Royal Bank Building
Honolulu, H. I., Castle & Cooke Building

From Canada
to Florida
and from
Maine to
California
H-B Life
Guards
Give
Maximum
Front-End
Protection

Safety in Any Kind of Weather at Levis, Quebec

H-B Life Guards in Levis, Quebec guarantee against front-end accidents. Regardless of snow and ice, H-B Life Guards are positive in operation. The instant the gate in front is touched, down goes the life guard, picking up and carrying the person safely until the car is stopped.

Levis, Quebec is typical of cities whose railways are equipped with H-B Life Guards.

In a paper given on Feb. 1, by H. L. Andrews of the General Electric Company before the Canadian Electric Railway Association, of 37 electric railways reporting, accidents on safety cars were 0.39 per 1000 car miles as compared with 0.59 for the larger cars.

The amount of money actually saved to the railways involved through a reduction of lawsuits and resultant claims can only be approximated but amounts to hundreds of thousands of dollars yearly.

Let us analyze your claim's expense and we can tell you how much you can expect to reduce it.

The Consolidated Car Fender Co.
Providence, R. I.
General Sales Agents
WENDELL & MACDUFFIE CO., 61 Broadway, N. Y.

Every Man

in Your Company may be a Superintendent some day

EVERY electric railway man should read "How I Made Good in the Electric Railway Field." This gripping, thrilling tale is full of action. It is the true story of the actual experiences and struggles of one who rose from the ranks by sheer merit to the position of general superintendent of one of America's great electric railway systems.

It is the life story of a man married, with three children and out of work, who gets a job as conductor—and makes good. Is promoted to starter, then head starter—and makes good. Determines to learn both the technical and practical sides of the electric railway industry — and makes good. Finally is appointed general superintendent of his company and makes good.

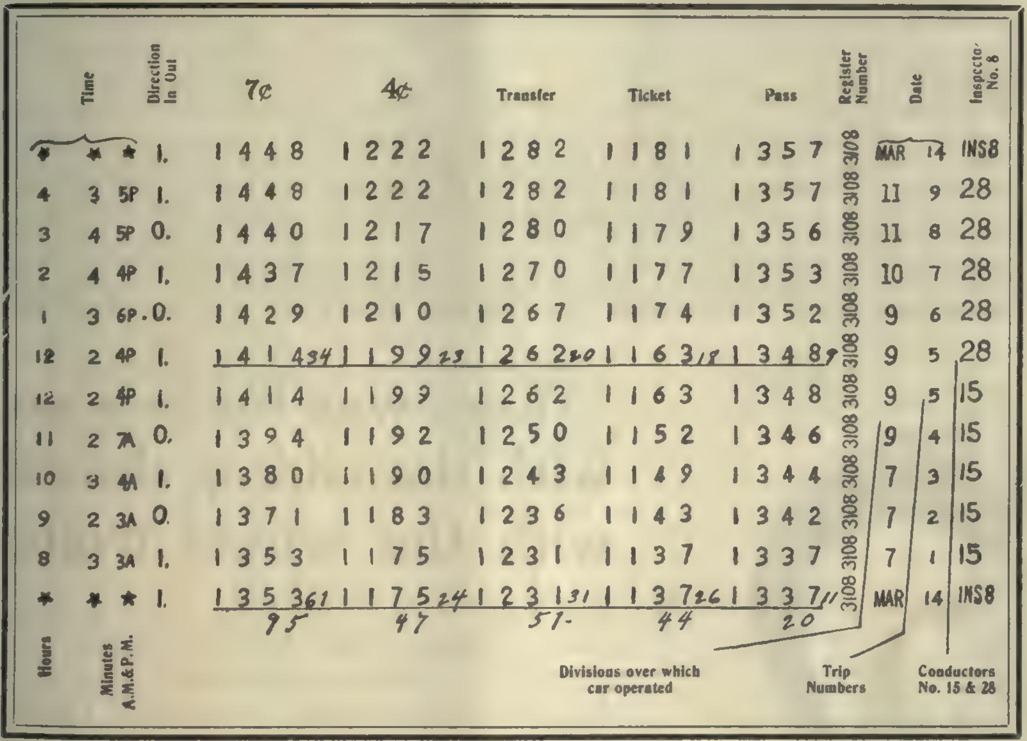
You can't help but admire his pluck and perseverance. He is of the type of men that have built up the electric railway industry to its present high state of efficiency. It took grit and backbone to do what he did—but he played the game, kept a stiff upper lip and put over his great ambition.

If you are an electric railway man you'll enjoy reading "How I Made Good in the Electric Railway Field." It is virile and inspiring. It proves that in America any electric railway man, whatever his job or handicap, can rise to the highest position in the gift of the company.

Perhaps you may guess the identity of the characters, for it is an absolutely true story, but for obvious reasons fictitious names of railways and officials have been substituted. If you will send us your name and address we will mail you a copy. IT IS FREE.

Electric Railway Journal
Tenth Avenue at 36th Street
New York, N. Y.

The Ohmer System



Time			Direction In Out	7¢	4¢	Transfer	Ticket	Pass	Register Number	Date		Inspecto- No. 8
*	*	*	I.	1448	1222	1282	1181	1357	3108	MAR	14	INS8
4	3	5P	I.	1448	1222	1282	1181	1357	3108	11	9	28
3	4	5P	O.	1440	1217	1280	1179	1356	3108	11	8	28
2	4	4P	I.	1437	1215	1270	1177	1353	3108	10	7	28
1	3	6P	O.	1429	1210	1267	1174	1352	3108	9	6	28
12	2	4P	I.	1414 34	1199 23	1262 20	1163 18	1348 9	3108	9	5	28
12	2	4P	I.	1414	1199	1262	1163	1348	3108	9	5	15
11	2	7A	O.	1394	1192	1250	1152	1346	3108	9	4	15
10	3	4A	I.	1380	1190	1243	1149	1344	3108	7	3	15
9	2	3A	O.	1371	1183	1236	1143	1342	3108	7	2	15
8	3	3A	I.	1353	1175	1231	1137	1337	3108	7	1	15
*	*	*	I.	1353 61	1175 24	1231 31	1137 26	1337 11	3108	MAR	14	INS8
				95	47	51-	44	20				

Hours

Minutes A.M.&P.M.

Divisions over which car operated

Trip Numbers

Conductors No. 15 & 28

The Ohmer Register printed record is the basis of the Ohmer System of fare protection. It is a clean cut, condensed, detailed report of the business done in each car each day. It not only tells the story of the day's business but it also furnishes indisputable, cumulative evidence of the ability and loyalty of each conductor as a salesman of transportation, and as your representative.

Ohmer Fare Registers are made in many different types and sizes to meet the various requirements of both city and interurban electric railway operation. We are in a position to help you out of your fare collection difficulties. Call on us.

Ohmer Fare Register Company
Dayton, Ohio

Safety car operation in Springfield, Mass., with Miller Trolley Shoes.

"There was far less arcing with the sliding shoe than with the wheel trolleys."

Thus reads a conclusion of a test made by an authority on a number of different trolley wheels and on Miller shoes.

It is just such conclusions as these that are continually winning many safety car operators over to the Miller Trolley Shoe.

If you'll make your slogan "Miller Shoes for Safety Cars or any other type" then you'll soon begin to reap the benefits, which are:

1. **No smashed overhead or breakage of trolley.**
2. **No arcing or burning trolley in two.**
3. **No limitation on use of steel or composition wire.**
4. **No broken trolley poles.**
5. **No traffic interruptions because of dewirements.**

Write Today for Details

Miller Trolley Shoe Co., West Newton, Mass

SPECIAL REPRESENTATIVE: Holden & White, Inc., Chicago

EASTERN REPRESENTATIVE: National Railway Appliance Co., New York

SALES REPRESENTATIVES:

Alfred Connor
Denver, Colo.

T. C. White & Co.
St. Louis, Mo.

F. F. Bodler
San Francisco, Calif.

W. M. McClintock
St. Paul, Minn.

S. I. Wailes
Los Angeles, Calif.

W. F. McKenne
Portland, Orego

Nuttall Helical
Gear and Pinion

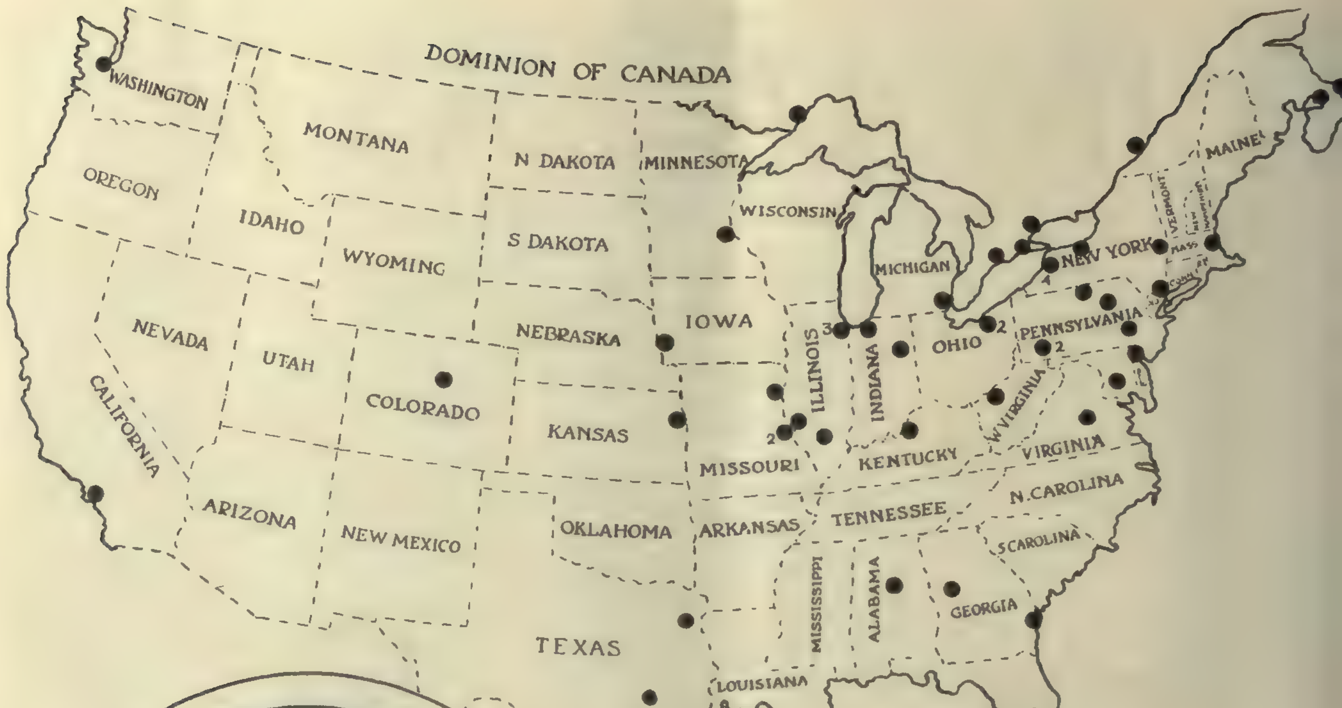
Between the Two Extremes

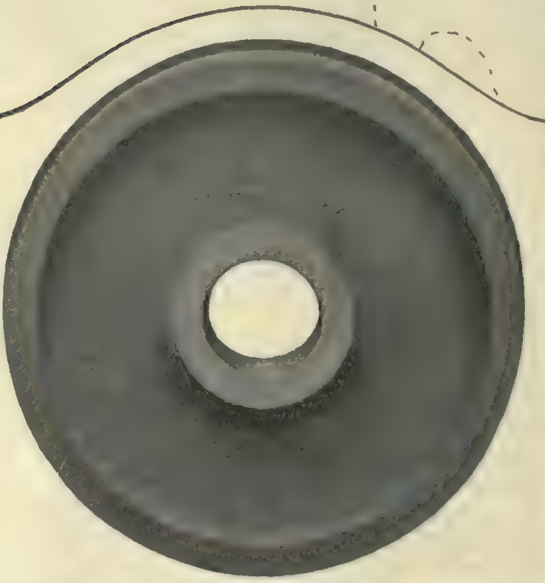
Whether Nuttall BP Helical Gears be installed in the lightest surface street car, or in the heaviest electric railway locomotive, they will give the same unequalled service, namely, four times the life of untreated gears in identical service.

**All Westinghouse Electric & Mfg. Co.
District Offices are Sales Representatives
in the United States for Nuttall Electric Railway
and Mine Haulage Products.**

**R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA**

Nuttall





49 *The map above shows the location of the 49 foundries in the United States and Canada, represented by the Association of Manufacturers of Chilled Car Wheels*

Chicago 3
St. Louis 2
Buffalo 4
Pittsburg 2
Cleveland 2
Amherst N.S.
Montreal
Mich. City, Ind
Louisville
Mt Vernon, Ill
Ft. Wayne, Ind
Birmingham
Atlanta
Savannah

Boston
Detroit
St. Paul
Kansas City, Kan
Denver
Tacoma
Rochester, N.Y.
Sayre, Pa
Berwick, Pa.
Albany
Toronto
New Glasgow N.S
Madison, Ill.

Huntingdon W Va
Wilmington, Del
Houston, Tex
Hannibal Mo
Reading, Pa
Baltimore
Richmond, Va
Ft. William, Ont
St. Thomas, -
Hamilton,
Ramapo, N.Y.
Marshall, Tex
Los Angeles
Council Bluffs

AMERICAN RAILROAD ASSOCIATION STANDARDS

650 lb. wheel for 60,000 Capacity Cars
700 lb. wheel for 80,000 Capacity Cars
750 lb. wheel for 100,000 Capacity Cars
850 lb. wheel for 140,000 Capacity Cars

The Standard Wheel for Seventy Years

Where

CHILLED IRON WHEELS

are made for Railway and Street Car Service

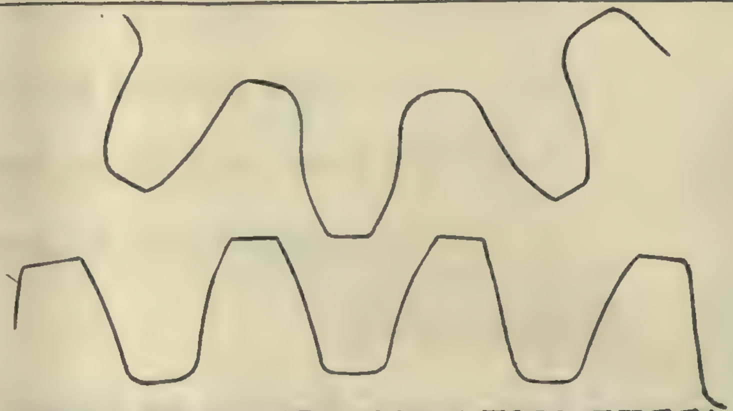
Capacity 20,000 per day
25,000,000 in Service

Association of Manufacturers of Chilled Car Wheels

1847 Mc Cormick Bldg.
CHICAGO

INDIA SAYS

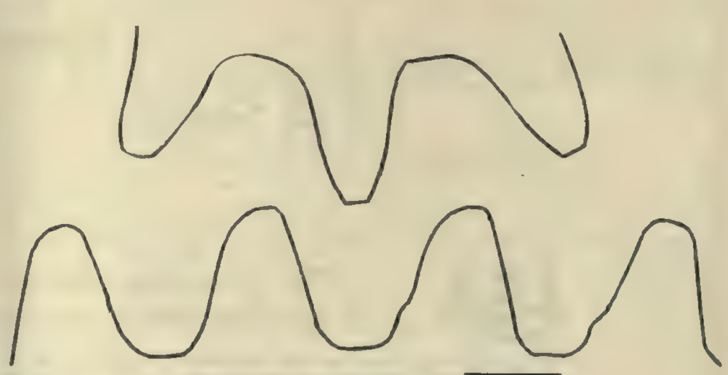
T. S. Q. means this



RUBBINGS TAKEN FROM TOOL STEEL
GEAR WHEEL AND PINION
MOTOR CAR NO. 67.
TAKEN ON 7-2-19.
MILEAGE. 73,637.

Comparison of
"Tool Steel" and ordinary gears
and pinions tested under
the same car

Test at Calcutta, India



RUBBINGS TAKEN FROM [redacted]
GEAR WHEEL AND PINION
MOTOR CAR NO. 67.
TAKEN ON 7-2-19.
MILEAGE 73,637.

"Tool Steel" Quality T. S. Q. "Tool Steel" Quality

Tool Steel Gear & Pinion Co., Cincinnati, Ohio

"STANDARD"

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

O. H. Steel and Malleable Iron Castings

Solid Forged Gear Blanks

Steel Forgings Iron Forgings

Forged and Rolled Steel

Pipe Flanges

Ring Dies

Rings

Roll Shells Steel Springs

S BRAND

"The 'Standard' Brand on your material is an assurance of eventual economy."

S BRAND

STANDARD STEEL WORKS CO.

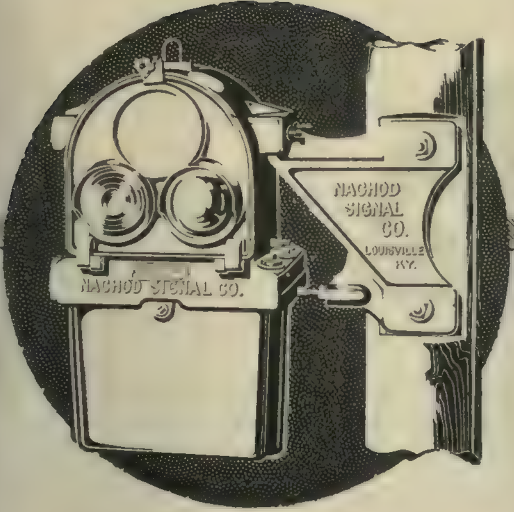
GENERAL OFFICES:

500 NORTH BROAD ST., PHILADELPHIA, PA.

CHICAGO
ST. LOUIS
HAVANA, CUBA
ST. PAUL

RICHMOND
SAN FRANCISCO
NEW YORK
HOUSTON

MONTEREY, MEX.
MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE


NACHOD SIGNAL CO.
LOUISVILLE KY.
NACHOD SIGNAL CO.

Keep Your Cars Moving

The manager speaks: "The main thing about operating street cars, and especially on single track lines, is to keep the cars moving and not have them waste a lot of time on switches waiting for meets. This, more than anything else, exasperates and drives away passengers."

Verily, the car on the switch gathers no dividends.

Nachod Signals are invaluable with

Safety Cars

to maintain the short headways that invite the public to ride. Nachod Signals tell the motorman when the block is clear to the next passing siding. Show him when he takes the block that he has stopped an opposing movement. Permit other cars to follow him thru the block, notifying them that the block is occupied and giving each an indication of protection in entering; meanwhile holding stop signals at the other end until the block is again clear.

NACHOD SIGNALS

protect all shifting moves automatically, permitting city and interurban cars to change order at a siding.

They save time by eliminating a stop, since they work at any speed. They operate from overhead contactors at any feasible line voltage and give duplicate indications of lights and disks that cannot be mistaken under any lighting conditions.

Catalog 719 describes Nachod Signals. Write for it.

Nachod Signal Co., Inc., Louisville, Ky.
Manufacturers of Automatic Signals, Highway Crossing Bells and Automatic Headway Recorders.

NACHOD SPELLS SAFETY

Bates Pole Prices Reduced

Reflecting the spirit of the times and realizing the necessity of returning to normal conditions as rapidly as possible, the prices of Bates One-Piece Steel Poles have been reduced. The new prices will be effective April 1st, 1921, and will apply on all quotations and proposals now outstanding.

It is our desire to boost the expansion of the Central Stations and Electric Railways in the most substantial manner possible by this reduction. It is our hope that this action will encourage and revive plans for lines that are now dormant.

Readjustment must come. The time is here and now—even though it means a sacrifice—and we are glad to assure the pole users of the world that we expect to do our share.

Write for our new price schedule and our 1921 Steel Pole Treatise and plan for permanent construction with Bates One-Piece Steel Poles.

Bates Expanded Steel Truss Co. 208 S. La Salle St.,
CHICAGO, ILL.

OKONITE
TRADE MARK
REG. U. S. PATENT OFFICE.

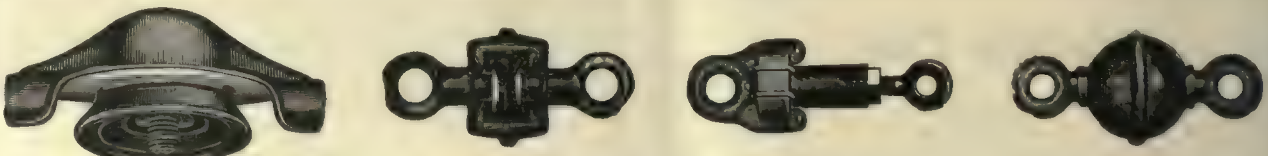
VARNISHED CAMBRIC
Wires and Cables

are made with the same care and high regard for quality which distinguishes the production of OKONITE rubber insulation.

We are prepared to handle any high grade proposition, and solicit your inquiries.

"Manson" Tape (Friction) **"Okonite" Tape (Splicing Compound)**

THE OKONITE COMPANY, Passaic, New Jersey
Incorporated 1884
CENTRAL ELECTRIC CO., Chicago, Ill., General Western Agents
F. D. Lawrence Electric Co., Cincinnati, O. Novelty Electric Co., Philadelphia, Pa. Pettingell-Andrews Co., Boston, Mass.



You Can Minimize Overhead Repair Work

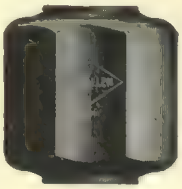
and successfully cut maintenance costs if you turn to

The Macallen Line

of strain insulators, hangers, splicing ears, crossings, and other overhead material.

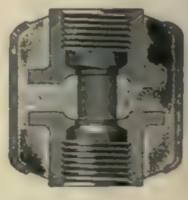
They are "specialty" products, designed and built to make "Macallen" the standard on American railways.

It will pay you to write for information and prices.



The Macallen Insulating Joint

Adopted by principal air brake manufacturers as part of their standard equipment. Also insulates steam pipes, etc. Shell is seamless drawn steel, nipples are machined from steel rod, and insulating material is Macallen Vulcanite Compound, not affected by heat or oil—practically indestructible.



May We Send Our Catalog?

TRADE MACALLEN MARK.

The Macallen Company
Macallen and Foundry Sts., Boston

TRADE MACALLEN MARK.

Perfect Contact

LINDALL
Brush Holder

THE problem of successful commutation is of the utmost importance. The larger the motor the greater the difficulty of maintaining perfect contact between commutator and brush.

Service tests covering a period of five years have shown that Lindall Brush Holders have materially improved operation of motors and at the same time reduced brush holder maintenance expense. The reasons are:

Better commutation and reduced motor flashing.

Brush pressure constantly maintained.

No pigtails required.

Inspection and brush renewal tasks simplified.

No troublesome screws or nuts.

Brushes do not have to be recessed.

Albert & J. M. Anderson Mfg. Co.
Established 1877
289-293 A St., Boston, Mass.

Branches—New York: 135 Broadway. Philadelphia: 429 Real Estate Trust Bldg. Chicago: 105 So. Dearborn St. London: 191-192 Tottenham Court Road.

THE U-RE-LITE

A modern Circuit Breaker to meet modern conditions. An I-T-E Circuit Breaker in a steel box: so much better than a fused switch that it is in a class by itself.

It opens instantly on the occurrence of a short circuit or a predetermined overload and can be as instantly reset, but it cannot be closed if the overload continues on the line.

IT DOES AWAY WITH THE CONSTANT EXPENSE AND THE DAMNABLE ANNOYANCE DUE TO THE USE OF FUSES, FOR THE CRY "FUSE BLOWN" MEANS IDLE MEN. It greatly diminishes the possibility of fire from electrical causes and affords positive protection to employees as well as to light or power circuits.

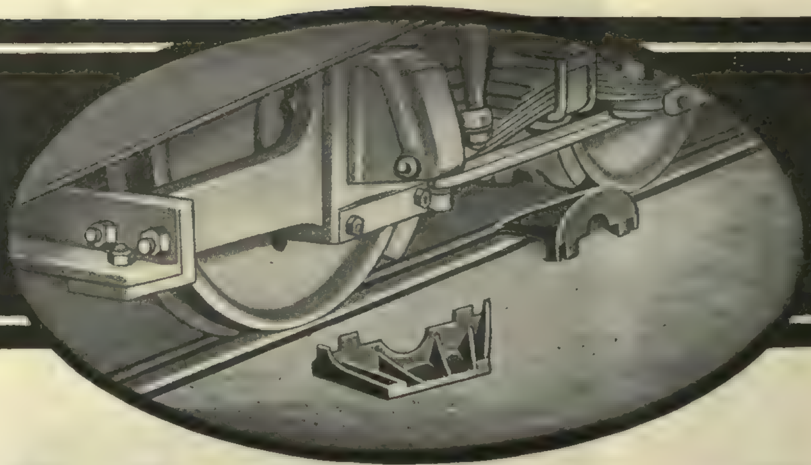
Made in capacities of 60 amperes and under for D.C. circuits of 250 volts or less and A.C. circuits of 250 volts or less, single phase.

Each pole is closed by a slight turn of the handle, which is seen projecting above and below the tripping knob, by means of which the U-RE-LITE may be opened manually.

First to the left,
Then to the right,
Turn the handle
And U-RE-LITE.

LITERATURE UPON REQUEST

The Cutter Company
PHILADELPHIA



Reading Trolley Replacers

Be Ready for any Emergency

Carry Reading Replacers right on your cars. Pick out the type you need. For safeties or interurbans, Reading Replacers get the cars back on the track the first shot.

They are light in construction but strong enough to do the work for which they are intended and take up very little space.

We manufacture all our own devices and can make shipment the same day order is received.

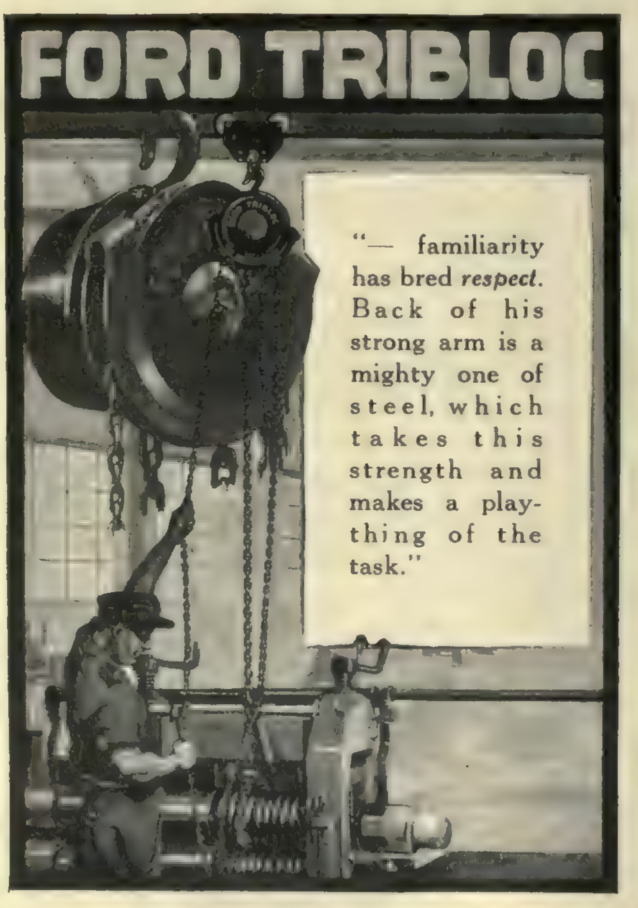
Write for particulars

AMERICAN CHAIN COMPANY, Incorporated

Reading Specialties Division

***General Sales Offices:* Grand Central Terminal, New York City**

District Sales Offices: Chicago Pittsburgh Boston Philadelphia Portland, Ore. San Francisco



"— familiarity has bred *respect*. Back of his strong arm is a mighty one of steel, which takes this strength and makes a plaything of the task."

Each Man a Giant

His strength, magnified, is the power that holds each mighty load. Crushing weights are mere playthings in his grasp. He handles them with confidence, knowing that his ally cannot fail.

Men are conscious of this power. They know that each movement of the hand chain will result in raising or lowering the load. They work with confidence, knowing that their FORD TRIBLOC cannot fail.

TRIBLOCS are all equipped with a Loop Hand Chain Guide, which prevents the hand chain gagging or overriding the flange. A FORD TRIBLOC may be worked from any angle, with speed, efficiency, and safety. You could doubtless use one or more. Let us send you prices.

FORD CHAIN BLOCK CO.
2ND & DIAMOND STREETS PHILADELPHIA, PA.

OVER-SEAS REPRESENTATIVE
ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA
51 CHAMBERS ST NEW YORK U.S.A.

PARIS BRUSSELS TURIN BARCELONA RIO DE JANEIRO

2180-

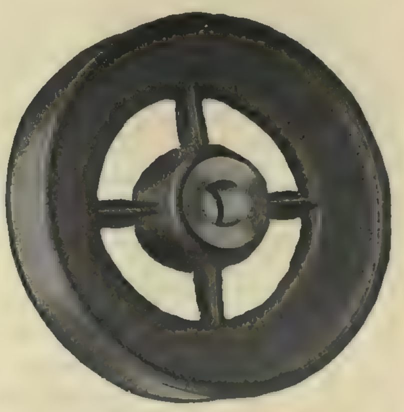
Mr. General Manager:—

Safety Car prices are lower. Do not delay improving your property. Order your Safeties now and watch your earnings increase and public sentiment improve. Send us your inquiry.

St. Louis Car Company
St. Louis, Mo.
"The Birthplace of the Safety Car"

You Don't Pay Us A Cent

unless you get complete satisfaction from Hensley Trolley Wheels. That's because they're guaranteed



Hensley Trolley & Mfg. Co.
Detroit, Mich.

Ask us now for details and revised prices

Bayonet Equipment

The Friend of High Speed Schedules

10
Seconds

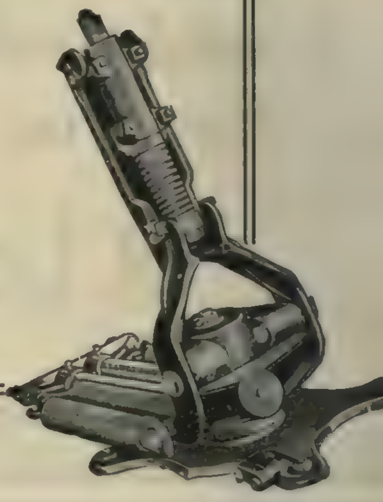
It is those quick repairs on the road—not in the leisure routine of the shop—which determine the reputation of your cars to live up to their schedule.

Bayonet Trolley Harps and Wheels can be changed in 10 seconds without tools. A pole fitted to a Bayonet Base can be changed in one minute by use of Bayonet clamps.

Rugged, perfectly fashioned and serviceable, this detachable feature impairs their durability in no way.

Sold on 60 Day's Approval. Write for details

BAYONET TROLLEY HARP COMPANY
Springfield, Ohio, U. S. A.



The advertisements in the

SEARCHLIGHT SECTION

of this paper

constitute the most comprehensive group of "live" opportunities to be found in any publication serving this industry.

Each announcement represents a current Want of a concern or individual in the industry with some element of profit in each for whoever can fulfill the need. Some have money saving possibilities, others are opportunities for more business; many are employment opportunities while still others offer chances to buy going businesses, plants, property, etc.

"Searchlight" advertisements are constantly changing. New opportunities find their way into this great Want medium each issue. Regular consultation of the "Searchlight" pages should be as important to the careful reader as reading editorial articles of his particular liking. One is news of the industry, the other, the NEWS OF OPPORTUNITIES being offered in the industry. No one can afford to overlook opportunities.

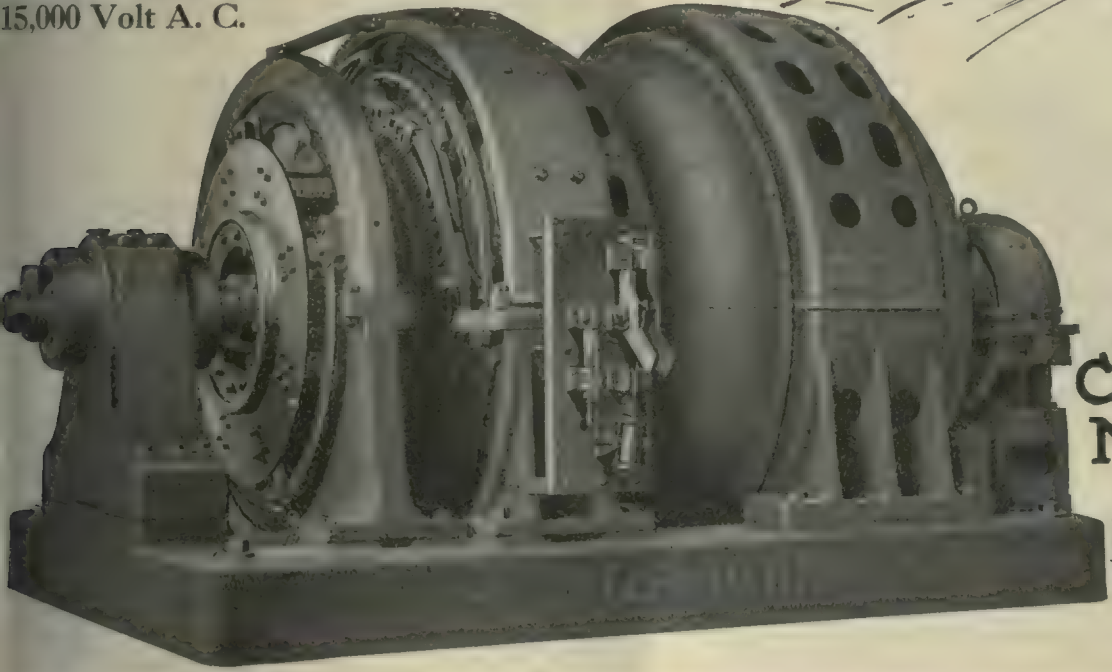
For Every Business Want

"Think* SEARCHLIGHT *First"

0140

ALLIS CHALMERS
Railway Sets -

1000 K. W., 600 R.P.M.
1200 Volt D. C.
15,000 Volt A. C.

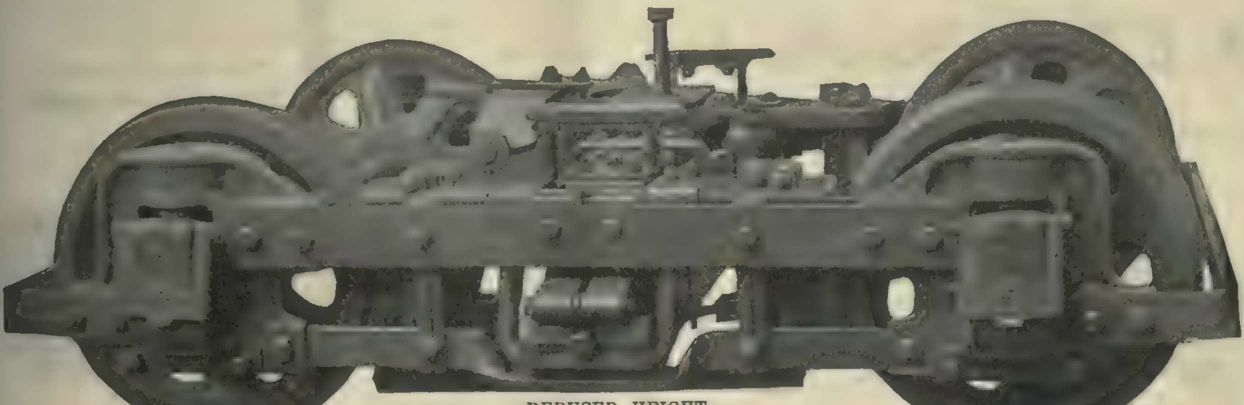


Allis-
Chalmers
Mfg Co.

Milwaukee,
Wisconsin.

R. H.

TAYLOR REDUCED HEIGHT TRUCK



REDUCED HEIGHT

TAYLOR R. H. TRUCK

Mounted on 26-in. Wheels with Springs Over Journal Boxes.
Designed to Mount Centre and End Entrance Cars Low Down.

SWING MOTION AND FULL ELLIPTIC SPRINGS

Wheel Base 5 ft. 2 in. For Car Bodies weighing 16,000 to 22,000 lb. Motors Inside Hung.

EASY RIDING

Journals 3¾ x 7 M. C. B. Type. Height from Rail to Body Bolster, 22¾ in. Brakes Inside Hung.

TAYLOR ELECTRIC TRUCK CO., TROY, N.Y.

SPECIFICATIONS ON REQUEST

Established 1892

SEND FOR PORTFOLIO

You Can Bend Rails Quickly and Economically With a Watson-Stillman Hydraulic Rail Bender

Hydraulic Portable Rail Bender

The portable rail bender shown herewith is designed for use on the road. It is equipped with interchangeable formed bending blocks, and will make any bend without buckling. The hinged yoke permits the rails to be put in sidewise. It can also be used for other heavy bending.

We build many other handy tools for the railway shop. Such as: Crank Pin Presses, Wheel Presses, Forcing Presses, Forging Presses, Jacks, Pit Jacks, Punches, Shears, Pumps, Accumulators, etc.

Write for Catalogs.

The Watson-Stillman Co., 46 Church St., New York
Chicago: McCormick Building
Philadelphia: Widener Building

Brake Shoes

A. E. R. A. Standards

Diamond "S" Steel Back is the Best Type

Standard Patterns for

SAFETY CAR

D-67 for Narrow Treads
D-87 for Wide Treads

American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago
Chattanooga, Tenn.

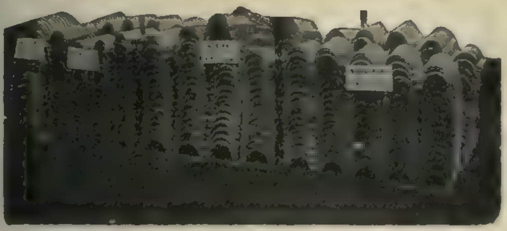
They are uniform in quality

They talk for themselves

W. J. Jeandron
227 Fulton Street
New York City

Pittsburgh Office:
636 Wabash Building

Canadian Distributors:
Lyman Tube & Supply Co., Ltd.
Montreal and Toronto



In this small space there are over a mile of

ACME "NESTABLE" Anti-Corrosive Galvanized Corrugated CULVERTS

It is possible because "ACMES," when nested, occupy only about one-eighth as much space as full circle culverts.

This feature enables users to keep a large supply of "ACMES" on hand. They can easily be stored in a small shed or in one corner of a stockroom.

Write for delivered prices

The Canton Culvert & Silo Co., Canton, O.
Founders of the Nestable Culvert Industry

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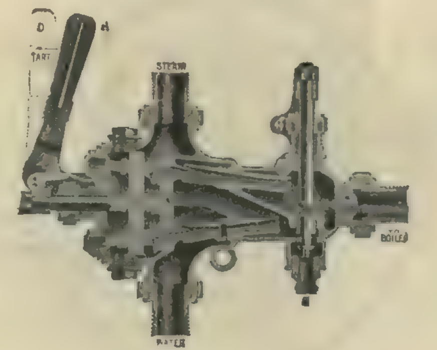

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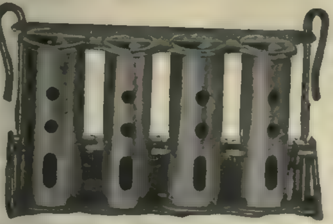

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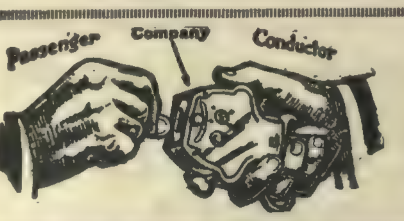

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PAYING machine-production wages today to men who use only their muscle, is the height of extravagance.

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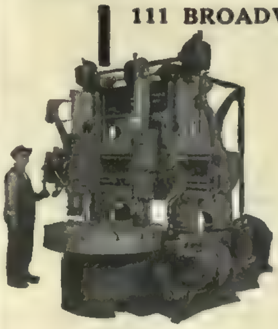

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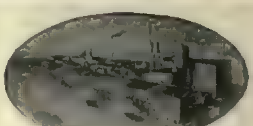

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THERE are more Bound Brook (Oil-less) Trolley Wheel Bushings in use today than all other makes combined. That is because Bound Brook Bushings, by virtue of their construction, invariably outlast all other types.

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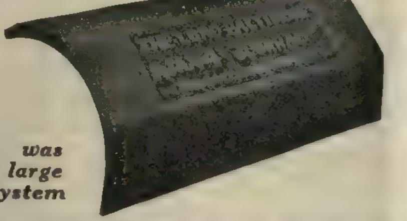

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We do not guarantee all our Car Brasses to wear as long—but this Time Record points to why, after thirty years' experience, Ajax Metals stand at the top.
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They are oil and dust proof.

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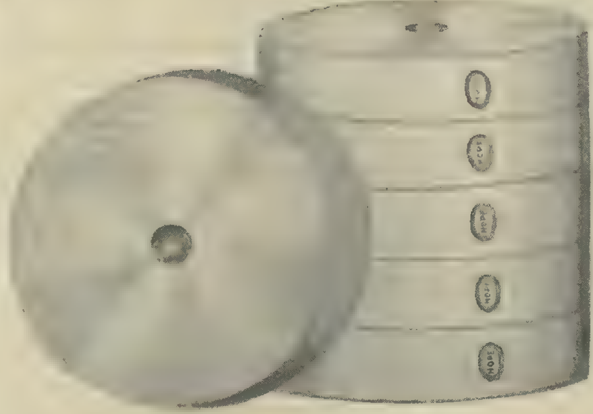

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WATER
PURIFICATION SYSTEMS
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FOR BOILER FEED AND
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"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings:
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Bemis Trucks
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Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

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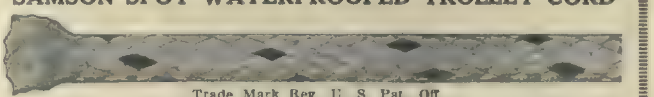

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Samples and information gladly sent.
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BARN foreman wanted. Location, New England. Must be familiar with inspection and maintenance of equipment as conducted on up-to-date property. Knowledge of motor practice, electrical equipment, and ability to handle union labor essential. No overhauling or painting. Seventy city cars all modern equipment. This is an unusual opportunity for capable man to make showing. State age, experience, present salary and references. P-865, Elec. Ry. Journal.

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WORKING day barn foreman wanted for western Pennsylvania road operating 30 cars. Must be able to keep down expenses and secure co-operation of employees. In first letter state age, position held, type of equipment worked on, salary expected. P-864, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

POSITIONS WANTED

EXPERIENCED outside construction man desires position in way of electric railway, lighting, underground and submarine cables. Most experience in city of 200,000 population. Can produce results. PW-828, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

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POSITIONS WANTED

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SUPERINTENDENT—Street railway construction, rehabilitation, special work installation, welding, grinding, paving; long experience; speedy; economic; reliable. Member Society Civil Engineers. PW-861, Elec. Ry. Journal.

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POSITIONS WANTED

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Standardize your Equipments at Minimum Cost

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For every service.

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New—Used—Rebuilt

MACHINERY AND SUPPLIES
for construction and industrial work.

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FOR SALE

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DYNAMOTORS

first-class condition. Car type 1200-600 V. 15 Amps

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RAILS—CARS

40—Steel undfr. 100,000 lb. cap. side dump ballast cars. Track Material—Frogs—Switches—Motors.

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Immediate Shipment

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Sizes 6 ft. 8 in. x 3 ft. 6 in. High

These screens are well made and are ready for immediate delivery from our West End Station, Cincinnati, Ohio.

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**30 lb., 40 lb., 50 lb., 56 lb., 60 lb.,
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We buy electric and steam railways that are to be dismantled

NEW REPAIR PARTS

from our large surplus stock can be bought at

ATTRACTIVE PRICES

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Prompt action is urged. These parts will sell quickly.

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15—K-10 second hand controllers equipped with ESSCo automotoneers with operating handle, no reverse handle.

4—K-14 second hand controllers, two equipped with ESSCo automotoneers. All have operating handles, no reverse handle.

Above controllers have been thoroughly overhauled with new parts necessary and are in excellent condition. Write **Purchasing Agent, East St. Louis and Suburban Railway Co., East St. Louis, Ill.,** for information and prices.

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At Your Service

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REBUILT **ELECTRIC MOTORS** REWINDING
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NEW A.C. MOTORS ½ to 15 H.P.—LARGE STOCK USED MOTORS
EXCELLENT REPAIR SERVICE ON ANY SIZE OR TYPE

CLEVELAND ARMATURE WORKS, INC.
EST. 1895 4732-4-6 ST. CLAIR AVE., CLEVELAND O. *INC. 1918*

S EARCHLIGHT
S ERVICE
S ECURES
S ATISFACTORY
S ALES

2004

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Acetylene Service & Apparatus
Oxweld Acetylene Co.

Advertising, Street Car
Collier, Inc., Barron G.

Air Circuit Breakers
Condit Elec'l Manufacturing Co.

Air Receivers
Ingersoll-Rand Co.

Air Aftercoolers
Ingersoll-Rand Co.

Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Angle Bars
Lackawanna Steel Co.

Automobile and Buses
Brill Co., The J. G.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
St. Louis Car Co.
Standard Steel Works Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Babbitt Metal
Ajax Metal Co.
More-Jones B. & M. Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

Bankers & Brokers
Coal & Iron National Bank

Batteries, Dry
Nichols-Lintern Co.

Bearings, Roller and Ball
Railway Roller Bearing Co.

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail
American Chain Co., Inc.
Niles-Bement-Pond Co.
Watson-Stillman Co.
Zelnicker, Walter A., Supply Co Inc.

Boilers
Babcock & Wilcox Co.

Boiler Tubes
National Tube Co.

Bond Testers
American Steel & Wire Co.
Rail Welding & Bonding Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.
Oxweld Acetylene Co.
Rail Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse Elec. & M. Co.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Bores—Junction and Outlet
National Metal Molding Co.

Brackets and Cross Arms, (See also
American Bridge Co.
Bates Expanded Steel Truss Co.
Creaghead Eng. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Poles, Ties, Posts, Etc.)
Ohio Brass Co.

Brake Adjusters
National Railway Appliance Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.

Brakes, Brake Systems and Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Westinghouse Traction Brake Co.

Bridges & Buildings
American Bridge Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Westinghouse Elec. & M. Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Bunkers, Coal
American Bridge Co.

Bushings, Case Hardened & Manganese
Bemis Car Truck Co.
Brill Co., J. G.
National Metal Molding Co.

Bushings, Graphite & Wooden
Bound Brook Oilless Bearing Co.

Cables. (See Wires and Cables)

Carbon Brushes. (See Brushes, Carbon)

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Railway Appliance Co.
St. Louis Car Co.
Thomas, Perley A.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Car, Self-Propelled
General Electric Co.

Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Castings, Funnel
Wharton, Jr. & Co., Inc., Wm.

Castings, Gray Iron and Steel
American Bridge Co.
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Standard Steel Works Co.
Wharton, Jr. & Co., Inc., Wm.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers. Trolley
Earll, C. I.
Electric Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Ceiling Car
Pantasote Co.

Change Carriers
Galef, J. L.

Circuit Breakers
Cutter Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers Track—(See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling—(See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Comstock Mfg. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Comstock Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines
Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.

Combustion Systems
Engineer Co.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Trac. B. Co

Compressors, Gas
Ingersoll-Rand Co.

Condensers
General Electric Co.
Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

Conduit Fittings
Chicago Fuse Mfg. Co.
National Metal Molding Co.

Conduits, Underground
Standard Underground Cable

Connectors, Solderless
Westinghouse Elec. & Mfg. Co

Controller Fingers
Russell Mfg. Co.

Controllers or Parts
Columbia M. W. & M. I. Co.
General Electric Co.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co

Controller Regulators
Electric Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co

Converters, Rotary
General Electric Co.
Westinghouse Elec. & Mfg. Co

Conveying and Hoisting Machin
American Bridge Co.
Columbia M. W. & M. I. Co.

Copper Wire
Anaconda Copper Mining Co.
Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., T
Roeblings Sons Co., John A.
Samson Cordage Works

Cord Connectors and Couplers
Electric Service Supplies Co
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Trac. B. Co

Cranes
Niles-Bement-Pond Co.
Toledo Bridge & Crane Co.. T

Cross Arms. (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossings, Frogs and Switches
Wharton, Jr. & Co., Inc., Wm

Crossings, Manganese
Indianapolis Switch & Frog

Crossing Signals. (See Signals. Crossing)

Crossings, Track. (See Track. Special Work)

Culverts
Canton Culvert & Silo Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Electric Service Supplies Co
Pantasote Co.
St. Louis Car Co.

Cutouts
Chicago Fuse Mfg. Co

Cutting Apparatus, Oxy-Acetyl
Oxweld Acetylene Co.

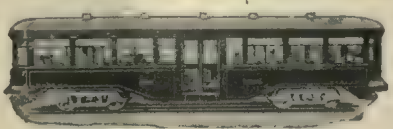
Dealers' Machinery
Archer & Baldwin
Cleveland Armature Wks.
Electric Equipment Co.
Foster Co., L. B.
Griswold Machine Co., Geo. M
Hyman Michaels Co.
Zelnicker Supply Co., Inc., Walter A.

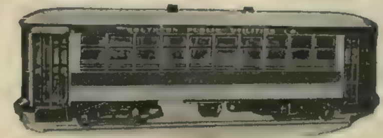
Derailing Devices. (See also Tr Work)
Cleveland Frog & Crossing Co

Destination Signs
Columbia M. W. & M. I. Co
Creaghead Eng. Co.
Electric Service Supplies Co

Detective Service
Wish Service. P. Edward

Dogs, Lathe
Williams & Co., J. H.





PERLEY A. THOMAS
CAR WORKS

Manufacturer of Cars
and Car Materials

Cars of all types from one-man to large interurban

HIGH POINT, N. C.

SASHES, DOORS
INTERIOR FINISH
VESTIBULES AND FRAMING

CURTAINS, VENTILATORS
SASH AND DOOR TRIMMINGS
DOOR AND STEP MECHANISM

Don't Remove Worn Wheels

It isn't necessary any more. Just equip your cars with Wheel Truing Brake Shoes.

If only the wheel tread needs truing, ask us to send you the brake shoe (section shown herewith).

We have a brake shoe for every kind of wheel wear.

Wheel Truing Brake Shoe Co.
Detroit, Michigan

WE CAN CUT YOUR COST OF HEATING CURRENT
Write for THERMOSTATIC CONTROL INFORMATION

GOLD

Electric Heaters Cut Installation and Maintenance Charge.
Ventilators Also Ventilate in Stormy Weather
Thermostats Save Current.
Originated the use of Non-Corrosive wire for Electric Car Heaters.
Originated The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS
GOLD CAR HEATING & LIGHTING CO., 17 Battery Pl., New York

Speed Up Repairs

Speed Up Repairs and save time and labor by using the Comstock coil winding machine and armature coil press.

The Comstock Mfg. Co.
Wilkes-Barre, Pa.

Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost.

The Cooper Heater Company
Carlisle, Pa.

FLOOD CITY

Rail Bonds and Trolley Line Specialties

Flood City Mfg. Co., Johnstown, Pa.

B. A. Hegeman, Jr., President
Charles C. Castle, First Vice President W. C. Lincoln, Mgr. Sales & Engineering
Harold A. Hegeman, Vice Pres. and Treas. Fred C. J. Dell, Secretary

National Railway Appliance Co.
50 East 42nd St., New York City

Hegeman-Castle Corporation
343 So. Dearborn St., Chicago, Ill.

National Railway Appliance Co.
Munsey Bldg., Washington, D. C.

National Railway Appliance Co.
Little Bldg., Boston, Mass.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Anderson Slack Adjusters
Genesco Paint Oils
Dunham Hopper Door Device
Feasible Drop Brake Staffs
Flaxlinum Insulation
Anglo-American Varnishes, Paints, Enamels, Surfacers, Shop Cleaner
Johnson Fare Boxes
Drew Line Material and Railway Specialties
Perry Side Bearings
Miller Trolley Shoes
Hartman Centering Center Plates
Economy Power Saving Meter
H & W Electric Heaters
Garland Ventilators
Pitt Sanders
National Safety Car Equipment Co's One-Man Safety Cars

Registers
International

International Fare Registers. Single registers, round and square; double registers, duplex counters, car fittings. Exclusive selling agents for HEEREN ENAMEL CAP AND COAT BADGES.

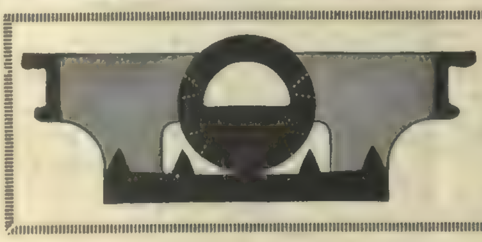
The International Register Co.
15 South Throop Street, Chicago

Type R5

See the Crank of the
CREAGHEAD DESTINATION SIGN

By means of it, conductor or motorman can change sign without leaving platform. All that has to be done is to turn the crank. Better investigate.

CREAGHEAD ENGINEERING CO., CINCINNATI, O.



STUCKI
SIDE
BEARINGS

A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

WHAT AND WHERE TO BUY

Door Operating Devices
Consolidated Car Heating Co
National Pneumatic Co., Inc.
Safety Car Devices Co.

Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc.

Draft Rigging. (See Couplers)

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Niles-Bement-Pond Co.
Ohio Brass Co.

Dryers, Sand
Electric Service Supplies Co.
Zelnicker Supply Co., Walter A., Inc.

Electrical Wires and Cables
Roebling's Sons Co., J. A.

Electrically-operated Switches (Air or Oil)
Condit Elec'l Manufacturing Co.

Electrodes, Carbon
Indianapolis Switch & Frog Co.

Electrodes, Steel
Indianapolis Switch & Frog Co.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. E.
Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Clark Management Corp., E. W
Day & Zimmermann, Inc.
Drum & Co., A. L.
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Englehardt W.
Horton, Barker & Wheeler
Jackson, Walter
Jacobs & Co., J. L.
Parsons, Klapp, Brinkerhoff & Douglas
Republic Engineers, Inc.
Richey, Albert S.
Sanderson & Porter
Sargent & Lundy
Scofield Engineering Co.
Stone & Webster

Engines, Gas, Oil and Steam
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

Expansion Joints, Track
Wharton, Jr. & Co., Inc., Wm.

Fare Boxes
Cleveland Fare Box Co.
Economy Electric Devices Co.
Johnson Fare Box Co.
National Railway Appliance Co.
Ohmer Fare Register Co.

Feed Water Heating
Schutte & Koerting Co.

Fences, Woven Wire and Fence Posts
American Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.
Star Brass Works.

Fibre and Fibre Tubing
Continental Fibre Co.
Westinghouse Elec. & Mfg. Co.

Field Coils. (See Coils)

Filters, Water
Scaife & Sons Co., Wm. B.

Flaxlinum Insulation
National Railway Appliance Co.

Floodlights
Electric Service Supplies Co.

Floor Plates
American Abrasive Metals Co.

Flooring Composition
American Mason Safety Tread Co.

Forgings
Carnegie Steel Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
Williams & Co., J. H.

Frogs, Track. (See Track Work)

Fuses and Fuse Boxes
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
Williams & Co., J. H.

Fuses, Refillable
Columbia M. W. & M. I. Co.
General Electric Co.

Gages, Oil and Water
Ohio Brass Co.

Gaskets
Power Specialty Co.
Westinghouse Traction Brake Co.

Gas-Electric Cars
General Electric Co.

Gas Producers
Westinghouse Elec. & Mfg. Co.

Gates, Car
Brill Co., The J. G.

Gear Blanks
Carnegie Steel Co.
Standard Steel Works Co.

Gear Cases
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Westinghouse Elec. & Mfg. Co.

Gears and Pinions
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
English Electric Co., Ltd.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Goggles, Eye
Indianapolis Switch & Frog. Co.

Gongs. (See Bells and Gongs)

Greases. (See Lubricants)

Grinders and Grinding Supplies
Indianapolis Switch & Frog Co.
Metal & Thermit Corp.
Railway Track-work Co.

Grinding Blocks and Wheels
Railway Track-work Co.

Guards, Cattle
American Bridge Co.

Guards, Trolley
Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley
Anderson M. Co., A. & J. M.
Bayonet Trolley Harp Co.
Electric Service Supplies Co.
Hensley Trolley & Mfg. Co.
Nuttall Co., R. D.
Star Brass Works

Headlights
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

Headlining
Pantasote Co.

Heaters, Car (Electric)
Consolidated Car Heating Co.
Economy Electric Devices Co.
Gold Car Heating & Lighting Co
National Railway Appliance Co
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Cooper Heater Co.
Smith Heater Co., Peter

Heaters, Car (Stove)
Electric Service Supplies Co.
Smith Heater Co., Peter

Helmets, Welding
Indianapolis Switch & Frog Co.

Hoists and Lifts
Columbia M. W. & M. I. Co.
Ford-Chain Block Co.
Niles-Bement-Pond Co.
Yale & Towne Mfg. Co.

Hose
Ingersoll-Rand Co.

Hose, Bridges
Ohio Brass Co.

Hydraulic Machinery
Niles-Bement-Pond Co.
Watson-Stillman Co.

Injectors
Schutte & Koerting Co.

Instruments, Measuring, Testing and Recording
Economy Electric Devices Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Insulating Cloth, Paper and Tape
Anchor Webbing Co.
General Electric Co.
Hope Webbing Co.
Okonite Co., The
Westinghouse Elec. & Mfg. Co.

Insulating Machinery
American Insulating Machinery Co.

Insulating Materials, China and Porcelain
Jeffery-Dewitt Co.

Insulation. (See also Paints)
Anderson M. Co., A. & J. M.
Electric Ry. Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Okonite Co., The
Westinghouse Elec. & Mfg. Co.

Insulators. (See also Line Material)
Anderson M. Co., A. & J. M.
Creaghead Engineering Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Macallen Co., The
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Insulator, China, Porcelain and Composition
Jeffery-Dewitt Co.

Insulator Pins
Electric Service Supplies Co.
Hubbard & Co.

Inventions Developed & Perfected
Peters & Co., G. D.

Jacks. (See also Cranes, Hoists and Lifts)
Buckeye Jack Mfg. Co.
Buda Co.
Columbia M. W. & M. I. Co.
National Ry. Appliance Co.
Watson-Stillman Co.

Joints, Rail
American Chain Co., Inc.
Carnegie Steel Co.
Lackawanna Steel Co.
Zelnicker Supply Company, Inc., Walter A.

Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.
Railway Roller Bearing Co.

Lamp Guards and Fixtures
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Arc and Incandescent. (See also Headlights)
Anderson M. Co., A. & J. M.
General Electric Co.
National Electric Specialty Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Signal and Marker
Nichols-Lintern Co.
Ohio Brass Co.

Lathe Attachments
Williams & Co., J. H.

Lathes, Car Wheel
Niles-Bement-Pond Co.

Lightning Protection
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Line Material. (See also Brackets, Insulators, Wires, etc.)
Anderson M. Co., A. & J. M.
Archbold Brady Co.
Columbia M. W. & M. I. Co.
Creaghead Eng. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
English Electric Co., Ltd.
General Electric Co.
Hubbard & Co.
Macallen Co., The
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Locking Spring Boxes
Wharton, Jr. & Co., Inc., Wm.

Locomotives, Electric
General Electric Co.
McGuire-Cummings Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Lubricating Engineers
Galena-Signal Oil Co.
Universal Lubricating Co.

Lubricants, Oil and Grease
Borne, Scrymser Co.
Galena-Signal Oil Co.
Universal Lubricating Co.

Lumber. (See Poles, Ties, etc

Machine Tools
Columbia M. W. & M. I. Co
Niles-Bement-Pond Co.
Watson-Stillman Co.

Manganese Steel, Special T Work
Indianapolis Switch & Frog C
Wharton, Jr. & Co., Inc., Wm

Meters, Car, Watt-Hour
Economy Electric Devices Co.

Meters. (See Instruments)
Electric Service Supplies Co.

Mica
Macallen Co., The

Motormen's Seats
Brill Co., J. G.
Electric Service Supplies Co.
Wood Co., Chas. N.

Motors, Electric
General Electric Co.
Westinghouse Elec. & Mfg. C

Motor and Generator Sets
General Electric Co.

Nuts and Bolts
Barbour-Stockwell Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.
Lackawanna Steel Co.

Ohmmeters
Weston Elec'l Instrument Co.

Oil Burning Equipment
Schutte & Koerting Co.

Oil Circuit Breakers
Condit Elec'l Manufacturing

Oil Motor Starters
Condit Elec'l Manufacturing

Oil Switches
Condit Elec'l Manufacturing

Oils. (See Lubricants)

Oxy-Acetylene, (See Cutting paratus, Oxy-Acetylene)

Packing
Power Specialty Co.
Westinghouse Traction Brake

Paints and Varnishes for Woodw
National Ry. Appliance Co.

Paving Bricks, Filler & Stretcher
Nelsonville Brick Co.

Paving Material
American Brake Shoe & Fdry.
Nelsonville Brick Co.

Pickups, Trolley Wire
Electric Service Supplies Co.
Ohio Brass Co.

Pinion Pulleys
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

Pinions. (See Gears)

Pins, Case Hardened, Wood and I
Bemis Car Truck Co.
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Traction Brake

Pipe
National Tube Co.

Pipe Fittings
Power Specialty Co.

Standard Steel Works Co.
Watson-Stillman Co.
Westinghouse Traction Brake

Planers. (See Machine Tools)

Pliers, Insulated
Electric Service Supplies Co.

Pneumatic Tools
Ingersoll-Rand Co.

Pole Reinforcing
Hubbard & Co.

Pole Top Switches
Condit Elec'l Manufacturing

Poles, Metal Street
Bates Expanded Steel Truss
Electric Railway Equipment
Hubbard & Co.

Poles, Ties Post, Piling & Lumbe
Duncan Lumber Co.

Poles, Trolley
Anderson Mfg. Co., A. & J. M
Bayonet Trolley Harp Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
National Tube Co.
Nuttall Co., R. D.

A Good Track

In economical railway operating, a good track is of prime importance. Not only is it economical but the safety of the passengers is dependent upon it to a large degree.

A track laid on wood cross ties is a liability after a few years of service. Constant repairs are necessary and frequent tearing up the street to put in new ties is a common occurrence. The end of a wood tie is the bonfire.

To insure a good track, Carnegie Steel Company recommends its

Steel Cross Ties

Expensive, yes, if first cost alone is considered. But wise investments are not figured that way. The track laid on steel ties is a permanent one. Once laid, they are there to stay—will outwear the life of the rails—and can be reused, if desired, in other track. At the end of their usefulness as cross ties, they can be sold as scrap at approximately one-third their original cost.

Considering long service, the element of safety, freedom from repairs, scrap value, and the satisfaction from their use, track laid on steel cross ties is the cheapest track obtainable—also the best.

If you are considering laying new track or repairing old, our engineers would be glad to discuss the matter with you. A copy of our pamphlet—Steel Cross Ties—would also be helpful. It contains interesting examples of roadbed construction and other valuable information. A copy may be had on request to nearest district office.

Carnegie Steel Company

General Office: Carnegie Building, Pittsburgh, Pa.

1416

YOUR ROADBED

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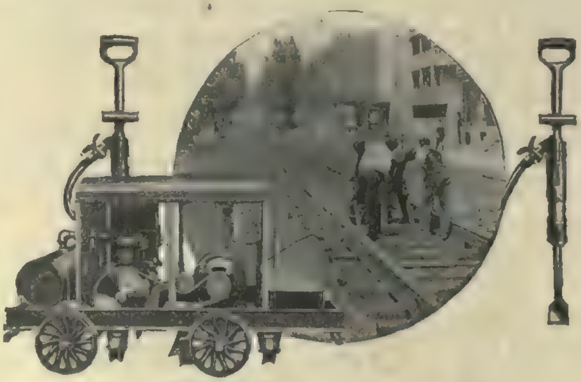
"Imperial" Tie Tampers save labor on this work, and they save labor on other jobs, for you can use them for tearing up any kind of pavement, cobble, asphalt or concrete.

The air furnished by the compressor may and should be used for bonding rails, tamping concrete, sandblasting, painting, and all the other useful ways that air can be applied.



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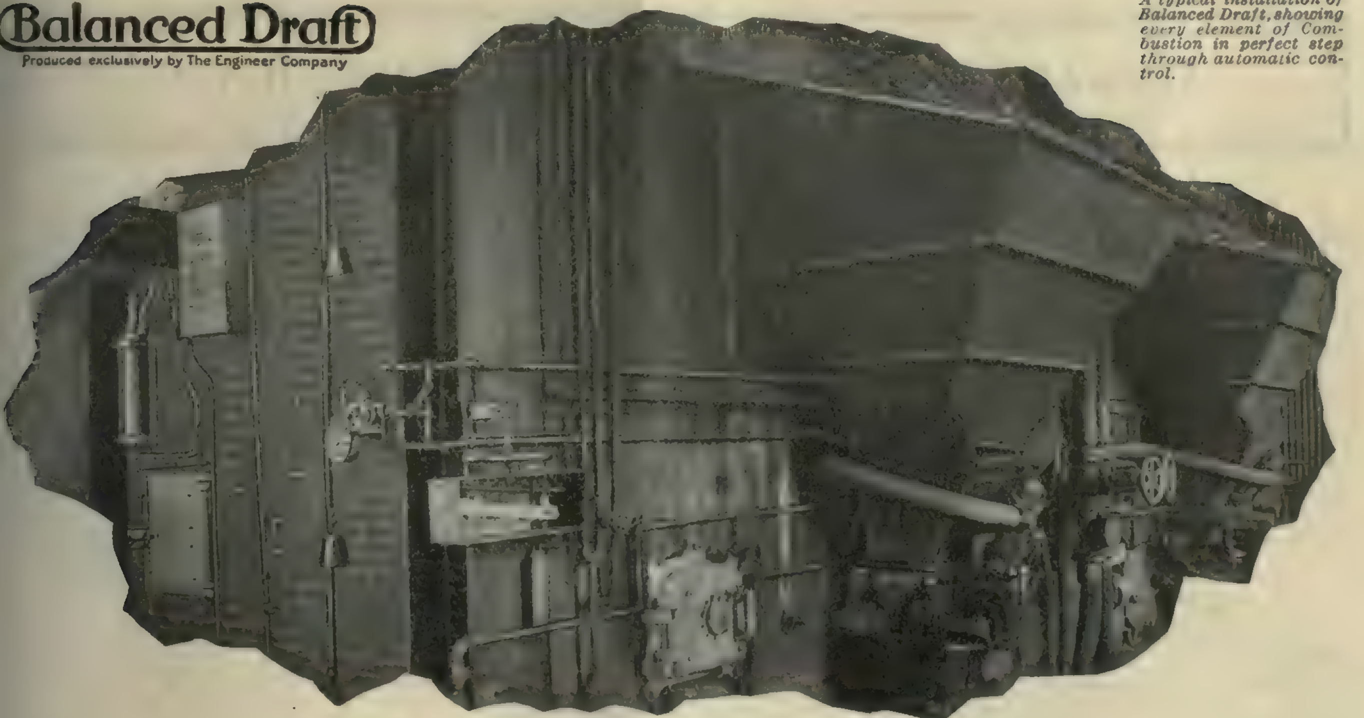

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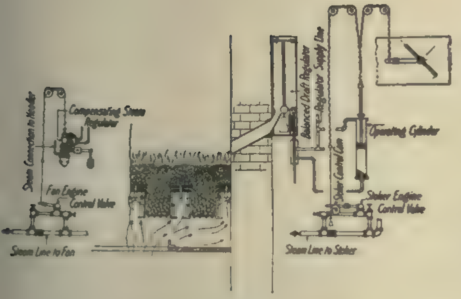

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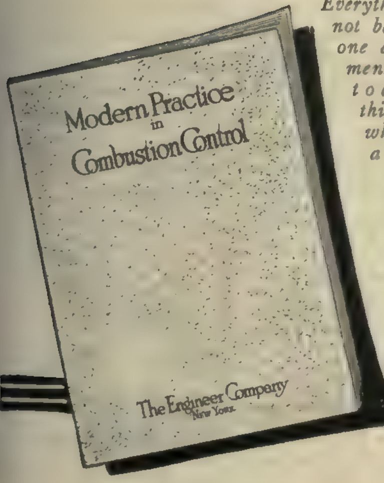
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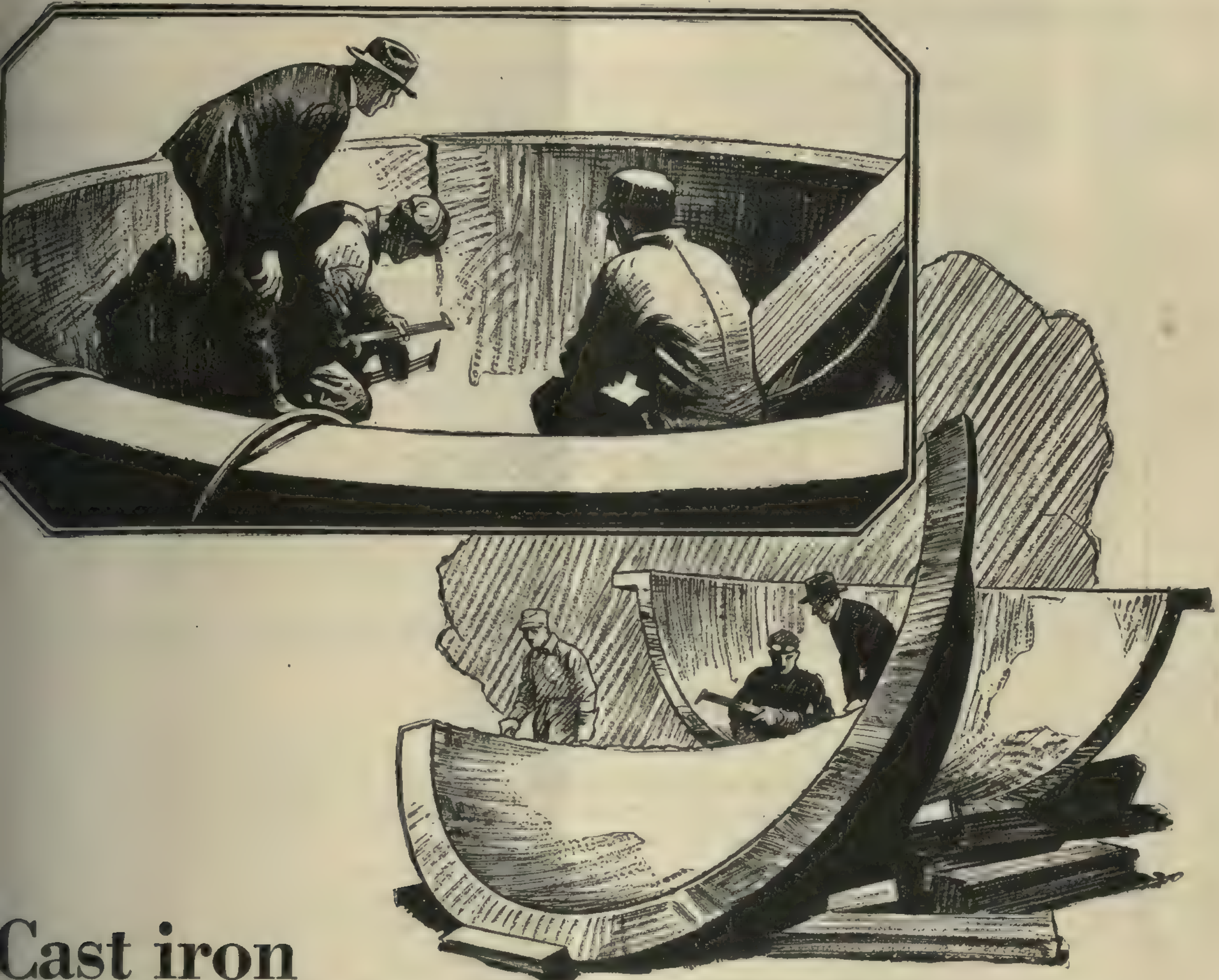

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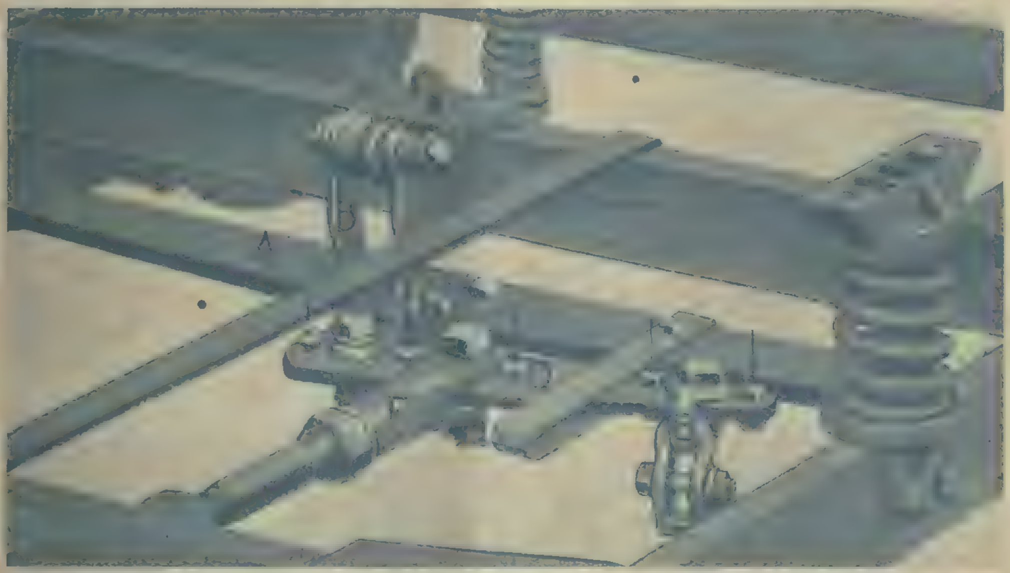
F. F. BODLER, 903 Monadnock Bldg., San Francisco, Calif.
W. McK. WHITE, 343 South Dearborn St., Chicago, Ill.



SAFETY BRILL FEATURES

BRAKE RIGGING OF BRILL 79-E TRUCK

Arranged so that the dropping out of any or all of the brake pins in the foundation brake rigging of this Standard Birney Safety Car Truck will not cause the **brakes to fail when needed, and result disastrously.**

The bolts (indicated by arrows) on each side of each brake pin connecting the various parts to the brake pull lever (D) will hold the pull lever holder (C), bottom brake rod (F) and clevis (E), extending around the pull lever, in place should the connecting brake pin fail or drop out. Also the jaws of the pull lever holder and bottom brake rod are shortened, coming quickly in contact with the pull lever should the connecting pins drop out, and performing their functions properly. The pull lever holder is also connected to the brake beam (A) and is suspended from the truck crossing by the brake beam hanger (B).

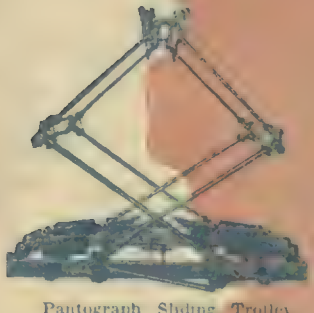
Vertical cylinder levers connected by the clevis (E) and the dead horizontal **lever are also equipped with these safety bolts.**

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

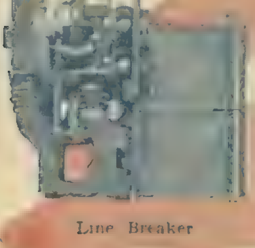
AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WASON MANF'G CO
ST. LOUIS MO. CLEVELAND, OHIO SPRINGFIELD, MASS.

Health, housing and happiness--these three factors in the modern industrial life are dependent upon rapid transportation to counteract the evils of congestion.

The World's Greatest Suburban Electrification



Pantograph Sliding Trolley



Line Breaker

As long ago as 1896 the General Electric Company suggested the electrification of the many-miled steam rapid-transit systems of "Melbourne the Magnificent." But it was March 1913 before the contracts were placed by the State of Victoria, Australia.

With the experience of the world to draw from, Merz and McClellan, the engineers, recommended the installation of 1500 volts direct current and the use of G-E motor and control equipment for the 400 motor cars and 400 trailers to operate over 335 miles of single track. They found the high-tension direct current was the lowest in both first and continuing costs.

Electrification at Melbourne is making possible a great increase in the steam schedule range of 13 to 18 miles per hour, thus helping to sustain the reputation of this metropolis as a city without congestion.

Controller

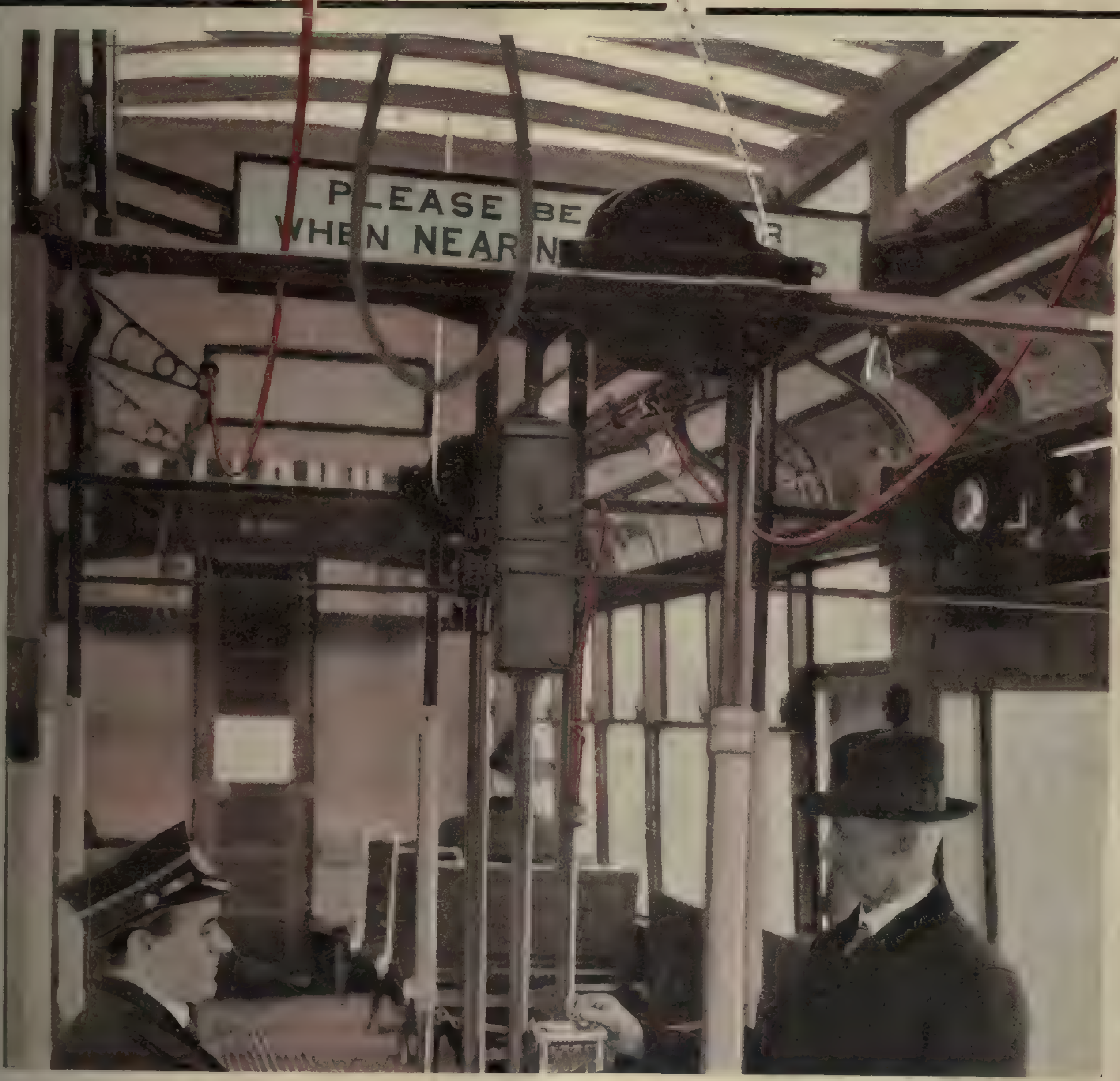
General Electric Company 35-91

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

McGraw-Hill Co., Inc. April 9, 1921 Twenty Cents Per Copy

ELECTRIC RAILWAY JOURNAL



Unique in that the positions of trolley bases and trolley catchers are changed about, these center-entrance cars are not different from other types in regard to the use of Samson Spot Trolley Cord, Samson Register and Signal Cords.

The solid braided guard ropes used in place of chains to prevent passengers from crowding past the conductor is also a Samson product. The life of your cord is the real test of its durability and economy.

Samson Cordage Works - Boston, Mass.

Selection of Equipment

What are the best types of cars for modern electric railway passenger transportation in congested centers?

We believe that the best service may be provided and the highest economy obtained in most cities by the use of two types of cars, namely, Safety Cars and light double-truck cars.

Why not investigate this important problem before ordering additional equipment? Analyze the yearly economy of a light-weight, double-truck car. All know the economy of the Safety Car.

Westinghouse HL Control and quadruple No. 508, 25hp. motors on light-weight cars, will efficiently handle rush-hour traffic in two- or three-car trains and, at the same time, provide economical single-car service during all other periods.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

Westinghouse

Vol. 57, No. 15 New York, April 9, 1921 *Pages* 667-708

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing-Editor

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Adjusting the Rate of Fare to the Length of Ride

Five-cent fares for short rides are retained by the Beaver Valley Traction Company, high zone fares having been found to decrease the utility of the electric railway. Short zones are established after traffic surveys.....Page 670

Street Railway Rate Tariff

Failure to allow proper base rates of fare results in practical confiscation of railway property, declares W. H. Sawyer. High fares mean more money although a loss in traffic. The rate of return should exceed the mere cost of money in order to allow for contingencies in the future.

Operation of Automatic Substation in Switzerland

Manufacturers of electrical apparatus have devised control to secure simplicity, reliability in operation and accessibility for repair. Devices differ from those in use in this country, one feature being the provision for starting and stopping by hand and by time clock.

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Advertising Index—Alphabetical, 46; Classified, 40, 42, 44; Searchlight Section, 38-39

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AND SAFETY

HOLD WITH A BOND
THAT NEVER YIELDS

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"Tight-Lock"
(AUTOMATIC)

CAR AND AIR COUPLERS FOR TRACTION SERVICE

Perfect Air Connections Maintained Under Severest Strain.

1. Save time and safeguard the employees in train make-up at terminals and junction points.
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3. Afford perfect rigidity between connections, welding two cars or ten into a single, solid, easy-running unit.

When it is a question of getting the utmost in coupler strength, safety, economy and convenience, the greatest Electric Railway systems in the world, such as the "Interborough" and the "Municipal" of New York, know the advisability of specifying "Westinghouse Tight-Lock."

Made in heavy and light designs for all forms of multiple-unit operation.

Westinghouse Traction Brake Company

General Office and Works, Wilmerding, Pa.

"Fourteen Miles East of Pittsburgh"

New York
San Francisco

Washington
Pittsburgh

Chicago
St. Louis

Private or Public Operation the Safety Car Is the Choice for Both

The city of New York has gone and done it again!

What?

Purchased more genuine Safety Cars.

The first lot of twenty-eight made such a hit with the public that now another forty-five have been ordered, some to give additional safety service on the Staten Island Midland Lines and others to inaugurate safety service on Williamsburgh Bridge.

What's of further interest is that the City of Detroit has followed New York's example, the first of its twenty-five Safeties already arrived started off the operation of the Detroit Municipal Railway.

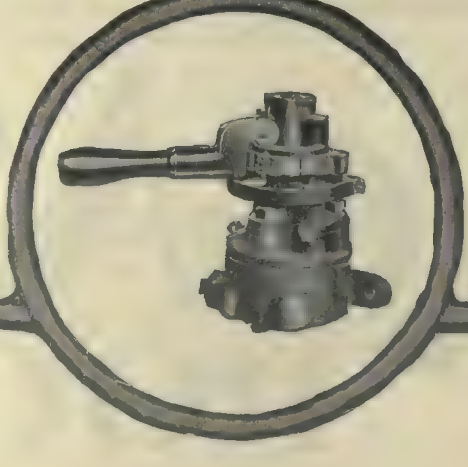
The examples of New York, Detroit, Seattle, Pekin, Ill., St. Petersburg, Fla., and other municipal lines will bear quoting if any official of your city administration wants to know the why and wherefore of the Safety Car.

You will be careful to impress him, of course, that these cars were selected because they are equipped with the famous Safety Devices Combination without which *no* car is a Safety Car.

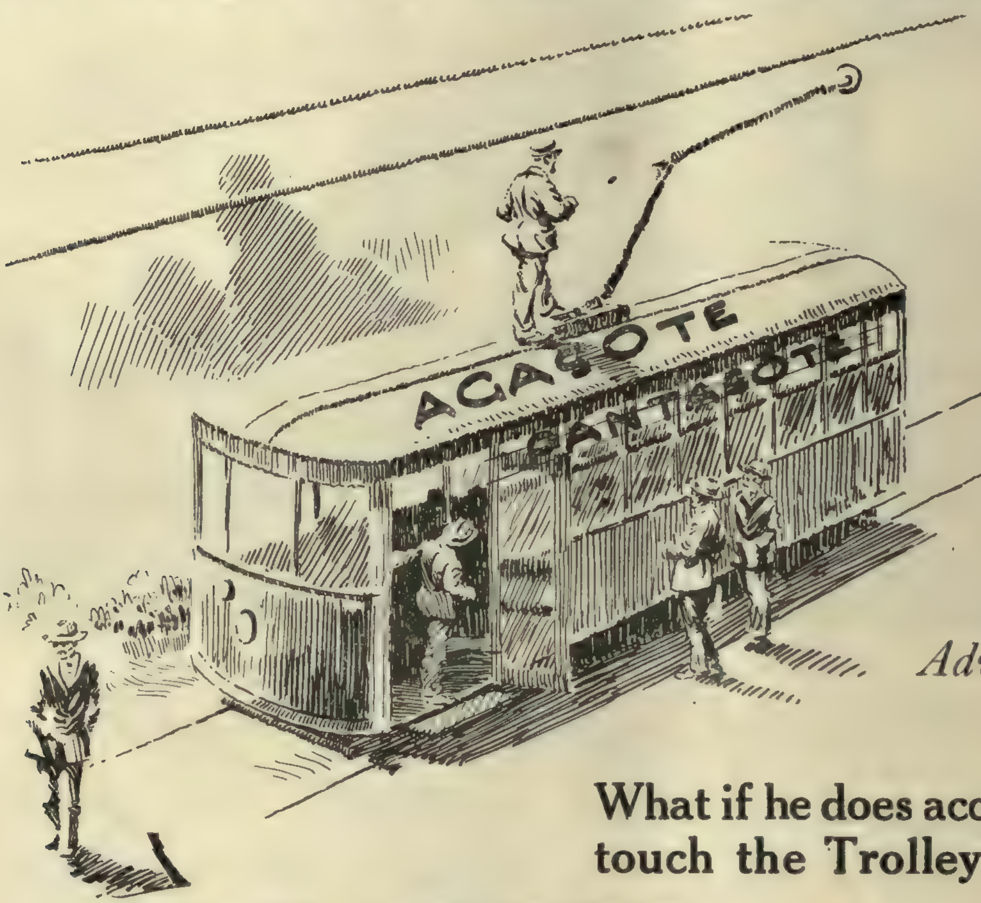
It Is a Genuine Safety Car Only When

it is equipped with automatic laborless apparatus, so interlocked that, regardless of the illness or distraction of the operator the power will be cut off instantaneously, the air brakes and sander apply immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed and the step folded before the car can start, and when the airbrake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

Safety Car Devices Company
Boatmen's Bank Bldg., St. Louis
Chicago San Francisco New York Washington Pittsburgh



10 AGASOTE ADVANTAGES



Advantage No. 5

What if he does accidentally touch the Trolley Wire

AGASOTE

is an absolute non-conductor of current

You may not fully appreciate this advantage—until some bad accident or fatality occurs on a non-insulating car roof—and you pay the cost. Agasote also insulates against *temperature*—Agasote-roofed cars stay COOL under the hottest summer sun, and warm and dry no matter how cold or wet the weather. Note also that walking on an Agasote Roof doesn't damage it—it's *thin* but STRONG.

We also manufacture Pantasote Curtains and Upholstery Material—
Standard in the field today

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The Other 9

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6. Needs no Auxiliary Coating.
7. Is light in weight.
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9. Saves Time.

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Day-Time Safety at Night with Imperial Luminous Arcs

Even on extremely low voltage—out at the end of the line, or on a steep hill—Imperial Luminous Arc Headlights project a clear, powerful, safety-bringing shaft of light.

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Imperials are sturdy, trouble-proof, reliable and require far less care than their effectiveness justifies.

Type LAA—Luminous Arc and Incandescent.
(Incandescent lamps are used when running through lighted streets of cities or villages)

Shall we arrange a demonstration on your road?

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February 1921 Edition

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Corrected to January 1921

Comprises 279 pages of authoritative and complete data on more than 950 electric railways in the United States, Canada and Mexico.

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Ch. Engr. J. A. Lucas.........Harmony
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4 sub. stas. tot. cap. 2000 kw.; 2 rot. conv.; 8 mo. gen. sets.

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It Gives at a Glance

in each report

- Name of company and address.
- Executives, ***Purchasing Agent*** and Managing Personnel with business address.
- Financial data, receiverships, affiliations, cost of plant, bonds, etc.
- Power house equipment; ***boilers and turbines,*** make and capacity; ***generators,*** make and capacity, etc.
- Power stations, repair shops; location.
- Communities served; names of them.
- Amusement Parks, ownership and location.
- Mileage, by single track, gage.
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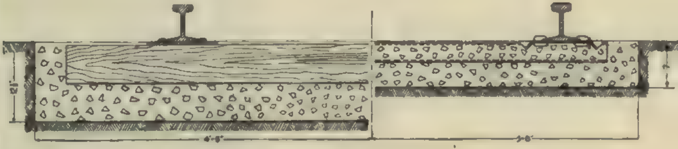
The comparative cross section shows clearly the large difference in cubic contents of the track foundation required for Steel Twin Tie Track and a common type of concrete construction.

Only eight hundred cubic yards of excavation and seven hundred and ninety cubic yards of concrete are required per mile of Twin Tie Track.



The labor saving in laying the track ready for concrete is largely dependent on two features of Steel Twin Ties.

The eight hundred and eighty steel twin ties required per mile weigh only one-third as much as two thousand six hundred and forty wood ties required per mile. Moreover, in fastening rail to the ties the simplicity of the jaw type rail clip saves up to fifty per cent of the time required to spike wood ties to the rail.

Careful check on these savings has been kept on track laid in 1920 and the savings vary from two thousand dollars to eight thousand dollars per mile of single track.

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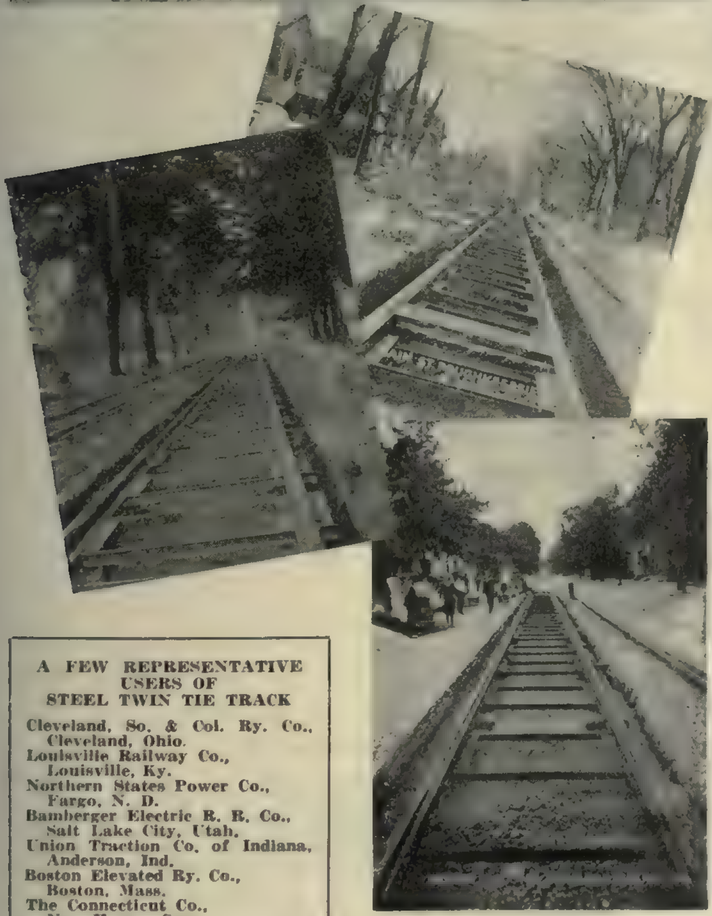
THE INTERNATIONAL STEEL TIE CO.
CLEVELAND, O.



A FEW REPRESENTATIVE USERS OF STEEL TWIN TIE TRACK

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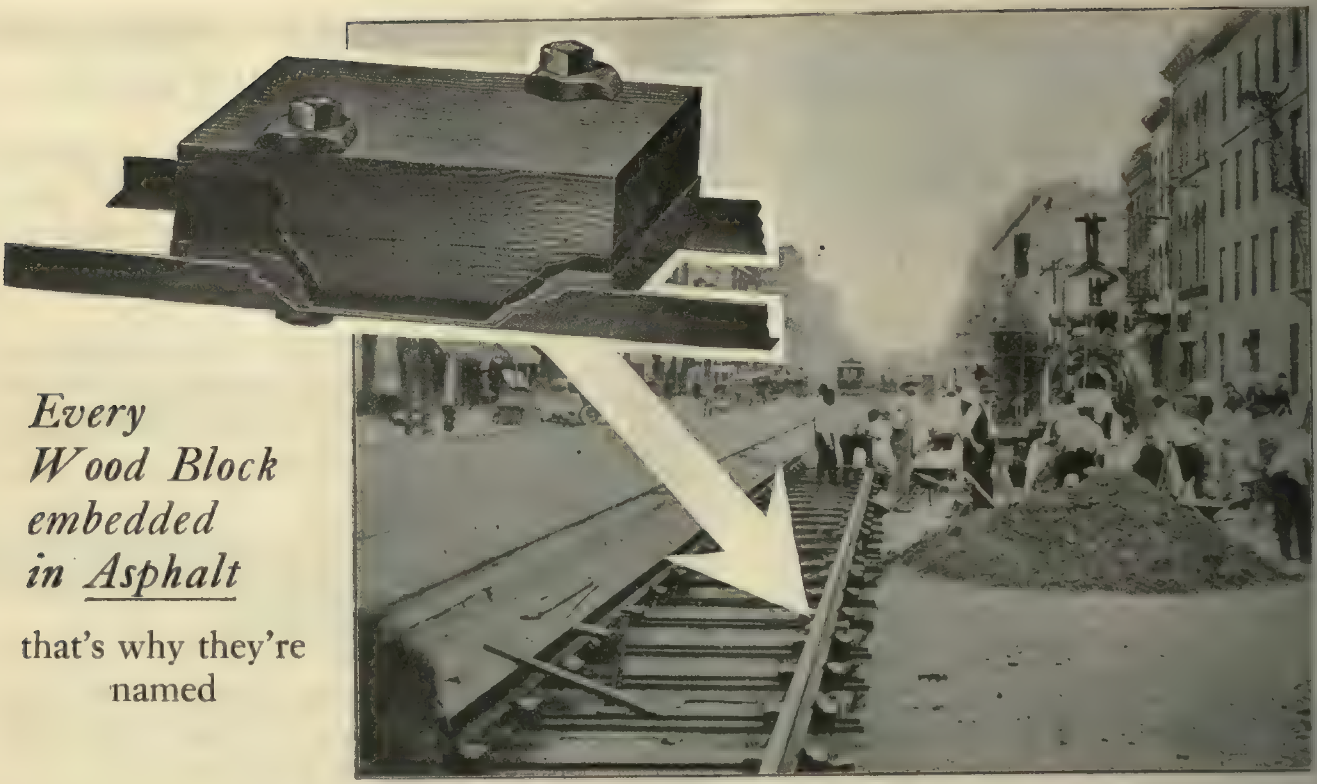
- Louisville Railway Co., Louisville, Ky.
- Northern States Power Co., Fargo, N. D.
- Bamberger Electric R. R. Co., Salt Lake City, Utah.
- Union Traction Co. of Indiana, Anderson, Ind.
- Boston Elevated Ry. Co., Boston, Mass.
- The Connecticut Co., New Haven, Conn.
- Chicago, N. Shore & Mil. R.R. Co. Highwood, Ill.
- The Cleveland Ry. Co., Cleveland, Ohio.

Steel Twin Tie Track

Steel twin ties are now manufactured and sold in Canada by the Sarnia Bridge Co., Ltd., Sarnia, Ont.



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Resilient

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The hammer blow of traffic is effectively transmitted to the concrete foundation thru any thickness or extent of steel and causes disintegration of the concrete underneath. The combination of wood and asphalt in the Dayton Tie dissipates the hammer blow from the car wheel and protects the foundation.

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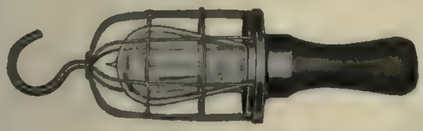
To light up dark places where men must work. To make such work easier and production greater. To stop lamp breakage and its frequent hazardous results.



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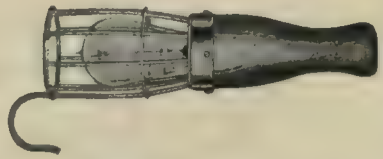

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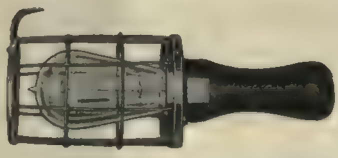

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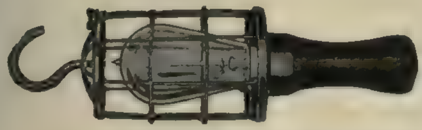
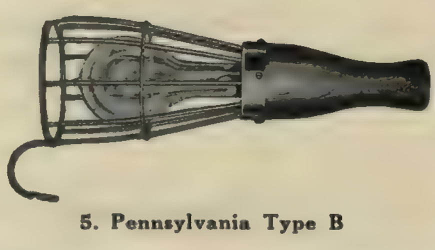


4. ESSCO Type (closed end)



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Approved by National Board of Underwriters.

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Electric Railway and Mine Haulage Material

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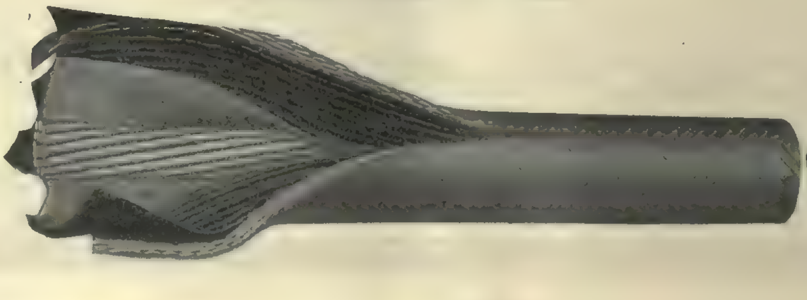

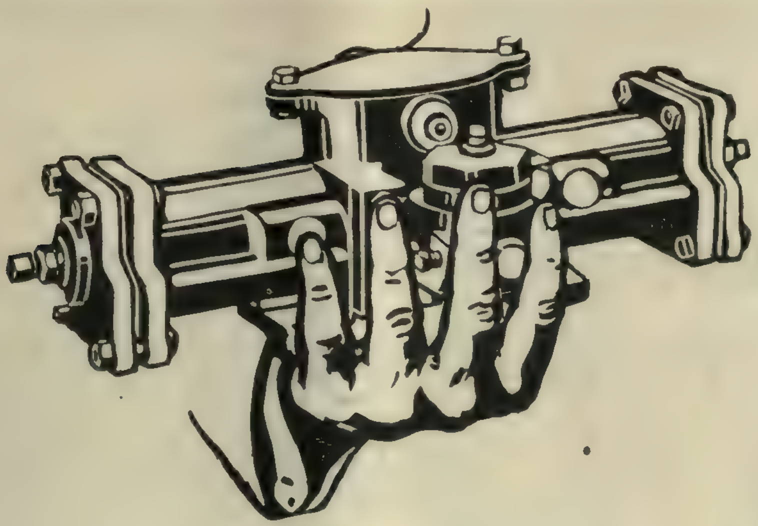

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"Pullin' 'em like that. That's the way y' get the rubber off."

That's exactly what the motorman said to his conductor one cold November morning as the latter rushed off the front end to snatch a can of hot coffee at a lunch wagon. He didn't like the violent way his mate pulled the door open.

We don't know whether the motorman said this because he was deeply interested in keeping down his employer's door upkeep expense or because he knew from previous winters how disagreeable it would be for him and his passengers to have a cold blast driving past a supposedly-closed door.

We do know, however, that because doors which are opened and closed with National Pneumatic Door and Step Control don't have to be slammed or yanked about, their runways, fixtures and pneumatic door buffers or cushions serve many thousands of miles with no maintenance attention whatsoever and go a long way to permit efficient, comfortable heating.

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Originators and Manufacturers of

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National Pneumatic Motorman's Signal Lights
National Pneumatic Safety Interlocking Door Control
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Make your peak periods produce maximum profit and efficiency

National Pneumatic Company, Inc.
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Works: Rahway, N. J.

Manufactured in Canada By Dominion Wheel & Foundries, Ltd., Toronto, Ont.

WE could write a long story, with pictures and everything; but it is enough to say that copper is now extremely cheap and the railway which attends to the bonding now is doing a wise thing, and one that will surely be a good paying investment, provided a suitable and lasting bond is selected.

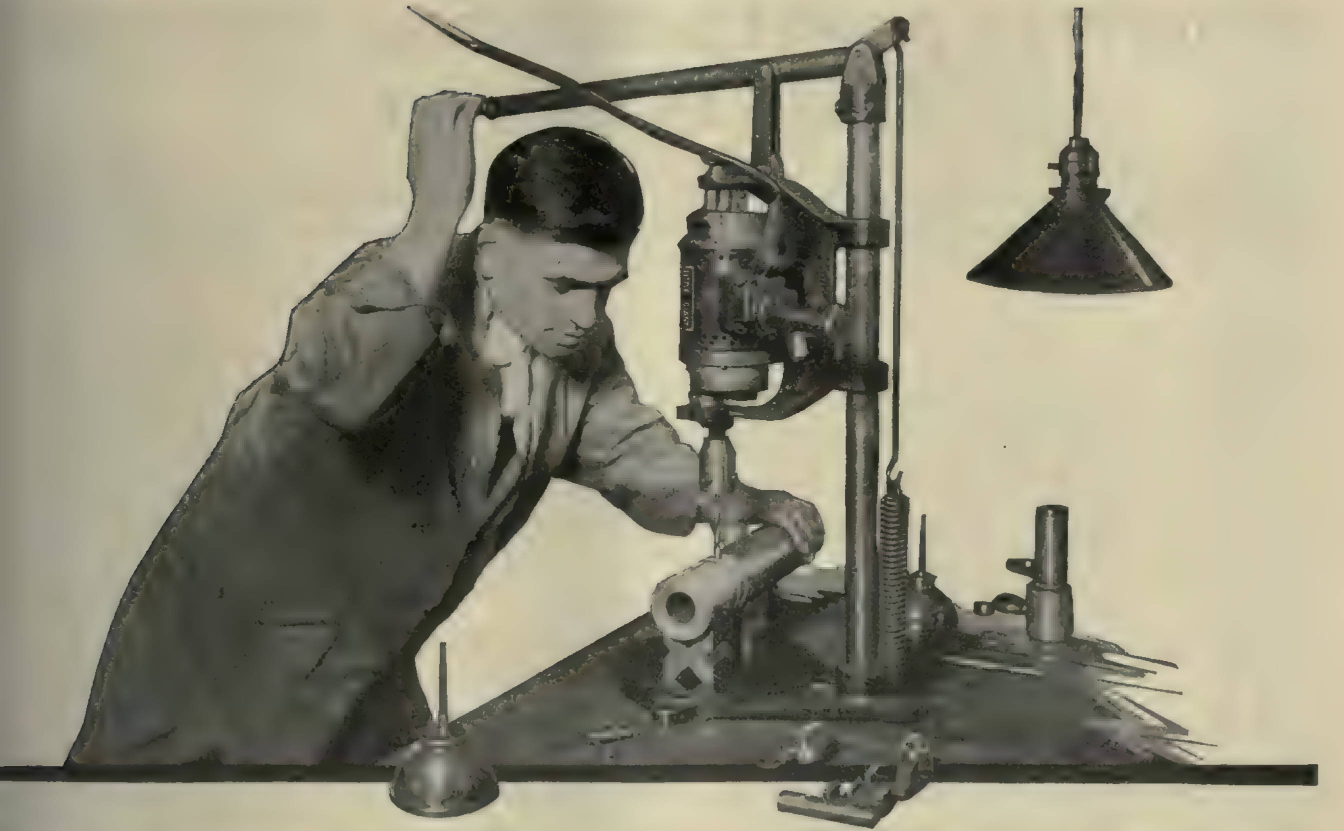
ERICO

Brazed or Arc Weld Bonds

in one type or another are just what you need

Write for Samples

The Electric Railway Improvement Co.
Cleveland, O.



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This simple, rugged de- ice is proving of tremen- ous value in shops and fac- ories everywhere, where it at times desirable to pro- ide a stationary drilling apparatus which can be quickly re-converted into a portable tool for general drilling, reaming and wood-boring operations about the plant.

If you are already lowering production costs with Little Giant Portable Electric Drills—the *quality* drill—enlarge their utility by adding Little Giant Drilling Stands.

If you are not using Little Giant Electric Tools, by all means investigate their many superior features. You can buy cheaper *drills* but you can't buy cheaper *drilling* than their use insures. That's why they are the choice of a wide majority of the world's largest users of portable electric tools.

Ask for Booklet 397.

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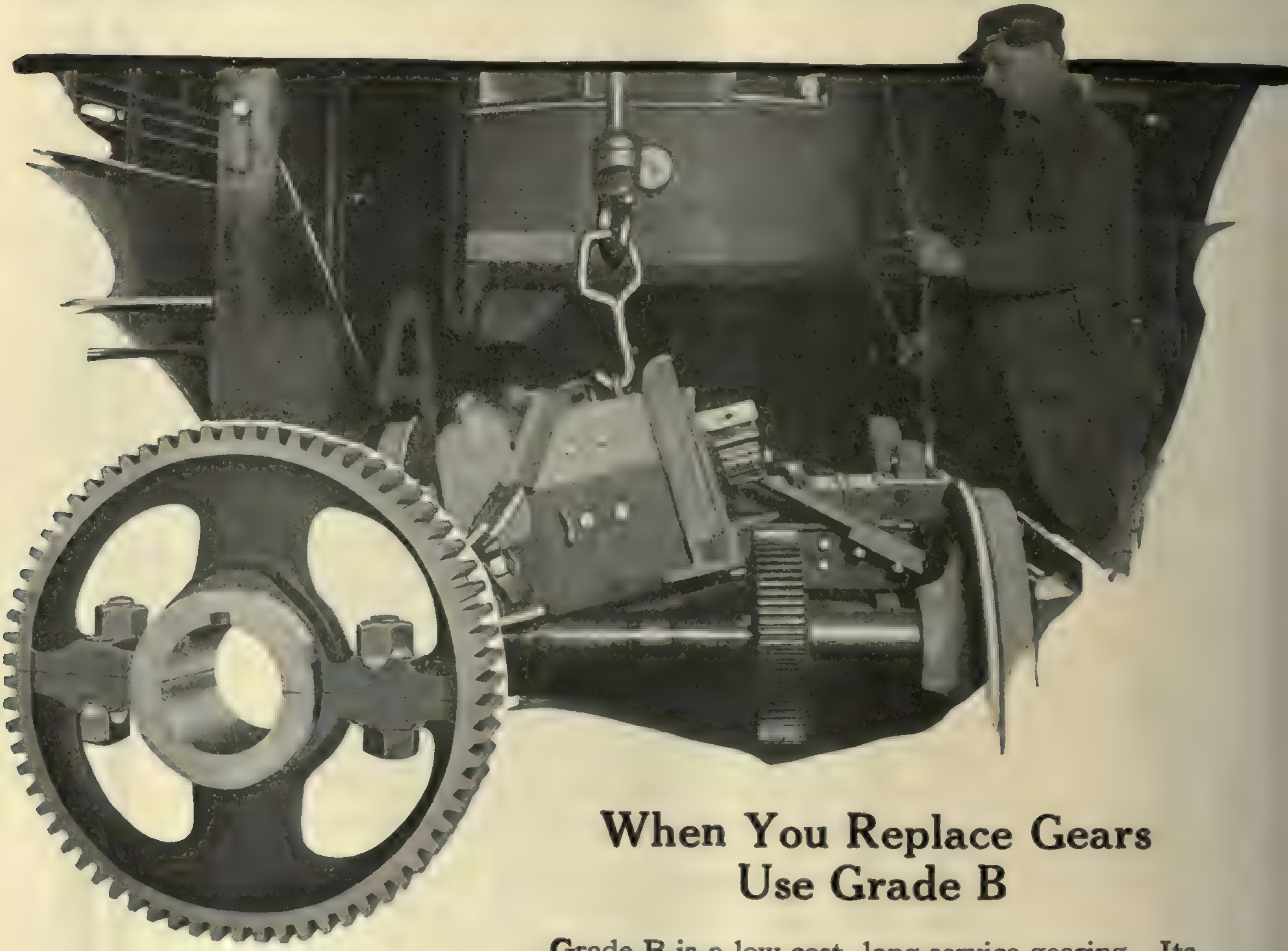

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All Franchise Clauses Should Be Clearly Expressed

THE controversy now going on in Toronto over the interpretation of a clause in the franchise of the street railway company again calls attention to the necessity for careful drafting of such grants so that all their terms may be clear not only at the time of origin but at any date in the future. The Toronto franchise expires on Sept. 1 of this year, at which time the city hopes to exercise its privilege of taking over the property. Thirty years ago when the grant was accepted both parties to the deal probably understood all the provisions. As the time for agreeing on a purchase price draws near there is a division of opinion over the intent of several clauses bearing on valuation.

One of the clauses says that in determining a value the arbitrators are to consider only the value of the actual and tangible property necessary to the operation of the railways; also, that the arbitrators are to award only the value at the time of the arbitration, "having regard to the requirements of a railway of the best kind and system then in operation and applicable to the said city."

It is interesting to note that while this franchise was drafted some thirty years ago, both parties to the agreement then recognized the principle that payment should be made only for "property used and useful in the public service." Since that time many of the public utility laws in the United States have embodied the same principle, and thus in determining a valuation of a public service property some of the old contentions have been eliminated. The Toronto grant would appear clearly to exclude any claim for capitalization of franchise, good will or earning power.

Woolworthing the Car Ride in Beaver Valley

BY "WOOLWORTHING" the car ride, nothing more nor less is meant than the application of the practices made so successful by the late Frank W. Woolworth to electric railway merchandising by the sale to customers of articles in such sizes or quantities that they can be sold for a small and single coin. Such an example of Woolworthing is given by the experience of the Beaver Valley Traction Company, described in this issue under the heading "Adjusting the Fare to Length of Ride." To discuss the pros and cons is unnecessary, inasmuch as the article speaks for itself, but an outline of the situation that had to be faced may be helpful.

The Beaver Valley Traction Company, as its name implies, is a river valley railway. It is one of those ong, shoestring roads serving a mixture of small towns and sparsely peopled country that is much more common in the United States than in countries which have been less liberal with electric railway promotion and building. In pre-war days it was a multiple-fare railway made up of 5-cent sections, but with a 4½-cent fare for the buyer of ticket books. First, the fares were brought closer to 5 cents flat. Later, the company "followed the crowd" by seeking increased revenue through a higher unit fare per section, this fare being successively 6 cents and 7 cents. These successive changes brought the company up squarely against the facts that its traffic was falling off and that it was not getting all the revenue hoped for and needed. From the railway checks of the traffic that it had (the passenger on the car) and of the traffic that it wanted (the rider in the automobile and pedestrian on the sidewalk), it turned out that more than half the actual and possible business was short haul. As a consequence, the management came to the conclusion that a shortening of the zones, the restoration of the 5-cent unit rate, the elimination of transfers on one route and the modification of transfers on another offered better prospects. Upon this change it superimposed a second one welcome to the short rider, namely, a shortening of headway from twenty to ten minutes on at least one line to date. The results have been all that could be expected, for the increase in traffic in the urban parts of the system has been great enough to produce more dollars than the longer ride at the higher fare.

The Problem of the Abandoned Line

THE report of the Massachusetts Department of Public Utilities on the subject of the support of electric railway lines in that State, reviewed elsewhere in this issue, is of interest outside as well as within Massachusetts as the report naturally includes a consideration of the question of abandoned lines. According to the report of the Massachusetts commission, in that state alone 371 miles of track have been abandoned up to the present time.

This condition existing in a state which has, from the earliest days of the industry, consistently applied strict regulation of all financing and operation shows clearly that there is something more than overcapitalization or mismanagement involved in the instance of these abandoned and poorly paying lines, in spite of the apparently unceasing clamor of political demagogues and would-be economists, whose chief stock in trade seems to be destructive rather than constructive criticism.

Although the Massachusetts report does not attempt any blanket recommendation for the resumption of service on all abandoned lines, it is at least constructive and reasonably optimistic. It clearly recognizes the economic fact that if a community is to have street car service somebody must meet the entire actual cost of that service, and it recommends that the individual community directly concerned devise the best means of meeting that cost, rather than resorting to state ownership or subsidy. At least it believes this plan should have a fair trial before any more extensive experiment be made in the direction of the State's assumption of the obligation. The probability of reduced wage scales and lower prices generally was apparently in the minds of the commissioners when they referred to possible future far-reaching economic changes which are likely to bring relief. The recommendation that the street railways be freed from all charges for construction and repair of streets and bridges and from the taxes intended to be in commutation of such charges would seem to be in line with sound public policy, and capable of relieving at least a part of the present strain.

The Massachusetts Department of Public Utilities has done wisely in refraining from attempting to specify particular lines which should be re-established and others which should not be. Presumably the people in the communities which have lost the service are best able to decide just how much they need the street railway after having done without it for a while or having tried some substitute methods of transportation. And if the legislation proposed by the department is acted upon by the Massachusetts Legislature, the people of that State will have at hand a means of preventing the discontinuance of any line, or the restoration of service on any line, by the simple but essential expedient of providing the necessary funds to keep it going.

Governor Miller Carries Through His Traction Reform

GOVERNOR MILLER of New York has had his way. One of his early official acts after taking office on Jan. 1 was to indicate to the legislators the need for constructive action looking particularly toward relief from the intolerable conditions into which war-time costs and the unbending attitude of the Hylan administration had thrown the railways in the greater city. Gradually as the purposes behind the Governor's special message became plain the opposition among the legislators dwindled until the only voices that remained to protest were those of the Democratic minority and the Socialists. Political strategy apparently dictated the course pursued by the Democrats. The Socialists of course, as ever, were the irreconcilables.

The bill that has become law is broad and sweeping in its powers, but no less so than would seem to be necessary if the regulatory bodies which it creates are to be permitted to function properly. On account of the investment of the city of New York in the present subways the cry has been raised by the opposition that the new measure is unconstitutional because it makes incumbent upon the city the acceptance of such proposals as may be evolved by the Transit Commission for New York City in laying down a plan for settlement there.

The bill does not provide a settlement; it merely creates a means whereby a settlement can be brought about. Until the commission has functioned and brought forth its plan it would seem that the opposition to the measure is merely tilting at windmills. The commission under its wide powers will have certain strong cards to play in the interest of the city, and it is not beyond the bounds of probability that the new body may evolve a plan of settlement under which the city will benefit no less materially than the companies.

Those who have assumed that the commission has been created by, for and in the interest of the corporations which it will regulate cast doubt on the motives of the Governor, indirectly charge with subservience all the legislators who voted for the measure and ignore all the evidence in the case. In arrogating to itself the sole right of defender of the city in the traction matter the Hylan administration assumes a rôle not altogether in keeping with its past performances. Many champions there are with no axes to grind who can be counted upon to come to the aid of the city if necessary, but they are content to remain impassive until the need shall become unmistakably evident that they should intervene.

The personnel of the commission is extremely important, probably more so than some of the law's provisions. Its announcement by the Governor is awaited with interest.

Should There Be an Exhibit This Year?

IT IS the time now when the association must decide whether it will hold an exhibit this year, and a questionnaire has been sent to manufacturer members asking their views on the subject. The circular is being sent at the request of a committee of manufacturers to whom President Gadsden has referred the matter. The position of the railways in this question is understood to be that if the manufacturers desire to make an exhibit they will be pleased to have one, but they consider the matter should be determined primarily by the manufacturing companies themselves. The latter have wisely decided to obtain a consensus of opinion, and the questions asked are whether the manufacturer members are in favor of holding an exhibit at Atlantic City this year, if the company will exhibit if such an exhibition is held, and if so how much space it will require. The letter mentions as reasons why the association might dispense with an exhibit this year the depression in business conditions and the fact that the proposition presented by the representatives of the pier at Atlantic City is considered unsatisfactory.

Considerable can be said both in favor of and against the plan of holding an exhibit. In favor of the plan, the principal arguments are probably as follows. An exhibit undoubtedly would attract a larger number of delegates to the convention than if there was no exhibit. This is especially true with reference to equipment men and others who do not travel around over the country so much as the higher officers and executives. To some manufacturers, particularly those making bulky exhibits, the annual exhibition is the most economical way by which this new equipment can be shown to a large number of railway men. With the exhibits and meetings on the pier, an unequaled opportunity is afforded to the attendants at the convention to make and renew acquaintances and discuss matters relating to the industry.

Among the positive arguments against the exhibit the most important undoubtedly is the large cost of transporting the exhibits to Atlantic City and renting the space there, and while the electric railway business may be in better condition than for some years past, the present business depression affects all manufacturers engaged in general business, and this includes of course most manufacturers of electric railway apparatus. There are, of course, precedents for the omission of the exhibit, as in 1915 on account of the exhibition at the San Francisco Fair, and in 1917 and 1918 on account of the war. In this connection it is argued by some that annual exhibits were justified in the early days of the industry when the exhibits were smaller and equipment was changing rapidly, but that an exhibit now every other year would probably answer all practical purposes. Again, with the exhibit omitted, some more central ocation than Atlantic City could be selected for the convention—some place, for instance, where the delegates can find much to interest them on the local railway. This would to some extent take the place of an exhibition and would actually allow the inspection of electric railway apparatus under working conditions. In such a case, manufacturer members could well assist in making the gathering a success by offering their services as guides over the property. With such a plan it is argued that the railway men would get more real information for every dollar of expense than they would if the meeting was held at Atlantic City. This plan of visiting a different city was the one followed by the association before the exhibits became so extensive that they could be housed only in a place with such facilities as are at Atlantic City. A return to the earlier policy, it is urged, even for one year, would be welcome, as it would give delegates an opportunity to study railway practice in some city of whose railway system and methods they have often heard but never had an opportunity to study at first hand.

Some of the arguments in favor of each plan have been recited so that the members can weigh them carefully before sending in their vote, if they have not already done so. In this connection the poll of the members of the Railway Business Association in regard to exhibits at the June convention in Atlantic City and the March convention in Chicago of the steam railroads is of interest. The decision of the Railway Supply Manufacturers Association to omit in 1921 its exhibit at Atlantic City was reached while the replies in this inquiry were being compiled. Of 146 Railway Business Association members expressing their sentiment by referendum, 43.2 per cent prefer holding the Million Dollar Pier and Chicago Coliseum exhibitions annually and 56.8 per cent favor holding them less often than once a year. Favoring biennial displays were 27.4 per cent; favoring triennial, 19.2 per cent. Other suggestions made up the difference. It is of interest to note also that the National Electric Light Association will not hold the usual exhibit in connection with its annual convention this year.

There is of course no question of giving up the technical meetings of the convention. The convention ought by all means to be held this year in some city, ither Atlantic City or elsewhere, and there ought to be a large attendance for the discussion of the reports and papers. Even f there is no exhibition his year attendance should nclude as full a represenation as in the past from he manufacturer compaies, not only so they can ell the railway men all f their own developments during the past year but so hat they can get ideas from he latter on ways to improve heir equipment. Further, hey can sense the thought and needs of the industry and be in a better position to assist in future developments. Finally, the reasons for the abandonment of the June steam railroad exhibit do not hold because, broadly speaking, the electric railways are undoubtedly in better financial condition than the steam railroads, as they have passed the depth of their depression.

The Trend in Wages Is Downward

TRAINMEN'S wages bulk large in the total of operating costs. An increase of a cent or two an hour in them often may mean the difference between black and red in the income figures just as a decrease in them of a cent or two may mean the difference between red and black. It is these facts that are now driving electric railways all over the country to insist that wages shall come down as part of the necessary readjustment in evidence everywhere to bring industrial conditions back more nearly to normal.

In Albany a strike followed the pruning of wages. Other strikes for the same cause would appear to be pending. In the light of the facts, however, the resort to the strike must prove, as it has in Albany, disastrous to the men who engage that means of trying to stem the inevitable tide of downward prices everywhere. The company at Albany has had very little trouble in recruiting an entirely new force at the reduced wages offered to its old men, while companies elsewhere are reported to have closed their waiting lists, so great has become the number of applicants seeking jobs.

Most significant of all, however, is the case of the Eastern Massachusetts Street Railway. While the men on the lines of that road still in operation are talking in stentorian tones through their accredited spokesman about resisting to the very limit a proposed reduction in wages, the men on the Gloucester lines of the company, many of whom have been out of work ever since the road there shut down on June 1, 1920, are seeking their old jobs at the new scale proposed to be made to apply to the whole system. Men who are still employed may be inclined to dispute the index figures which indicate the trend of the cost of living, but men such as those at Gloucester, who are out of a job, are the real judges of what their labor will command in the open market.

Labor, skilled and unskilled, may not be a commodity, but it is worth only what it will command in the open market. Even with increasing intelligence everywhere it is still difficult to obtain acceptance of the fact that wages are to a very large extent self-adjusting. That this is so is indicated by the instances at Albany and in Eastern Massachusetts which have just been cited. If the employer had as much to do with fixing labor prices as labor is inclined to think, then the unscrupulous employer would indeed be in a position to wield an influence most detrimental to society.

Quotation from the Federal Electric Railways Commission Report

No. 15

WE WOULD particularly urge public officials and officers of the electric railways to cooperate seriously in the protection and preservation of all corporate, financial and cost records.

Service-at-cost plans have been recently rejected by popular vote, largely on the issue of valuation, in Chicago, Denver and Minneapolis. The public, justly or unjustly, has become so suspicious of the electric railway companies that it may be expected to reject any service-at-cost or public ownership question submitted to popular vote, no matter how fairly the plan may be formulated, if it is not thoroughly convinced that the capital item has been fairly and honestly arrived at. The failure of a company to preserve its record may in the end hurt its stockholders more than it may the public.

PANORAMIC VIEW OF NEW BRIGHTON, THE HEADQUARTERS OF THE BEAVER VALLEY TRACTION COMPANY

Adjusting Fare to Length of Ride

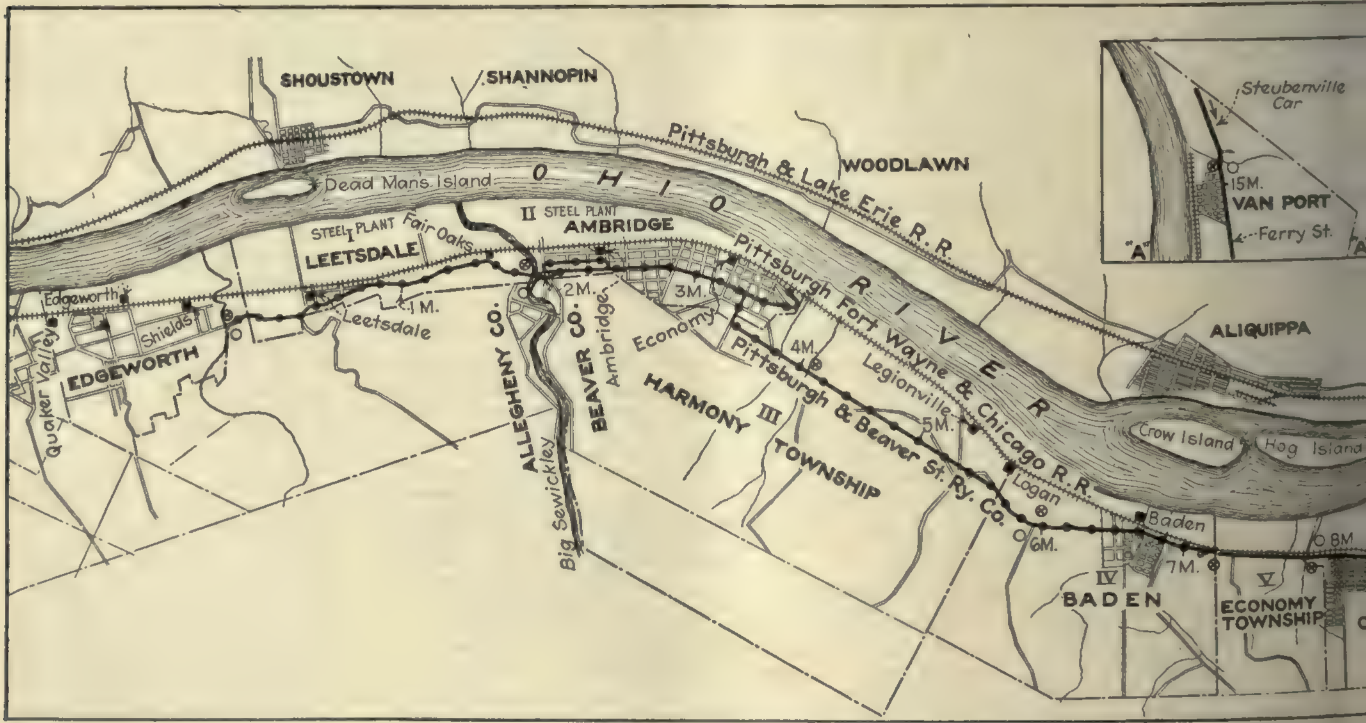
Five-Cent Fares for Short Rides Retained by Beaver Valley Traction Company, High Zone Fares Having Been Found to Decrease the Utility of the Electric Railway—Short Zones Are Established After Traffic Surveys — Incidentally Revenues Have Increased as Railway Keeps Functioning

THE contradictory deductions made from data on fare increases in relation to changes in traffic have proved the necessity for studying each property and even the individual lines of each property separately in order to equate the value of the different factors that make up the total result. A study of this kind has been made available by W. H. Boyce, general manager of the Beaver Valley Traction Company, who is a decided believer in studying and meeting the needs of transportation patrons from the merchandising standpoint.

A COUNTRY SHOESTRING SYSTEM

The Beaver Valley Traction Company and its associated Pittsburgh & Beaver Street Railway are not favored by a heavy tributary population. There are 26 miles of route and 51 miles of track for a population of about 66,000. The trunk line, as shown on the accompanying map, strings along for 19 miles through the Beaver and Ohio valleys between the boroughs of Leetsdale and College Hill, with branch-offs to Beaver and Monaca (2.69 miles and 1.5 miles respectively) and a 2.59-mile crosstown line known as the Riverview Line between New Brighton and Beaver Falls. Expansion of the towns is almost everywhere limited by rivers and hills. Even the largest towns are but twelve squares or blocks in width while the smaller communities are only four to seven squares wide. The back country is merely very poor farming land with little tributary population. The travel characteristics on such a system are naturally dependent to a large degree upon the location of the manufactories and picture houses in the district.

Except for Beaver and Baden, the district along the railway is industrial, with steel and iron production predominating and glass, brick and other clay industries also a factor. Quite a large number of the



LAYOUT OF THE BEAVER VALLEY TRACTION COMPANY A middle-class citizenry work in Pittsburgh and commute via the Pennsylvania and Pittsburgh & Lake Erie Railroads, whose routes are also shown on the map. As the Pennsylvania runs fifty-seven trains and the Pittsburgh & Lake Erie fifty-six trains daily, it may be guessed that the electric lines do not get much through business. Then, too, the steam rates to commuters are only $11.90 per month for a sixty-trip ticket covering a one-way 28-mile ride. With an average of but fifty-two trips a month, this is 1,456 miles for $11.90 or 0.82 cents per mile, a rate out of the question for single-car electric operation in this kind of territory.

Besides this practical monopoly of long-haul business by the steam railways, the electric railways have to contend with the insidious and ubiquitous private automobile which cuts into both short-haul and long-haul opportunities indifferently. Indeed, as most of the system is along the Lincoln Highway, the electric railways have the doubtful pleasure of paying for the upkeep of paving used both by the stranger and by the local man who is letting the car rider pay for his pleasure! As a rule the thoroughfares in this territory are wide and most of them are paved. The electric railways must not only maintain the usual strip of paving but in some cases are expected to pave the whole street as well.

The topographical conditions mentioned naturally tend to make most of the communities, small though they are, self-contained. Each town has its own grocers, meat shops, clothiers, churches, etc. The proximity of Pittsburgh and the diffusion of the valley population are factors which tend to keep theatrical road shows out of the Beaver Valley. Strong rivalry between the excellent picture houses in Beaver Falls and Rochester is one of the few causes of intertown travel.

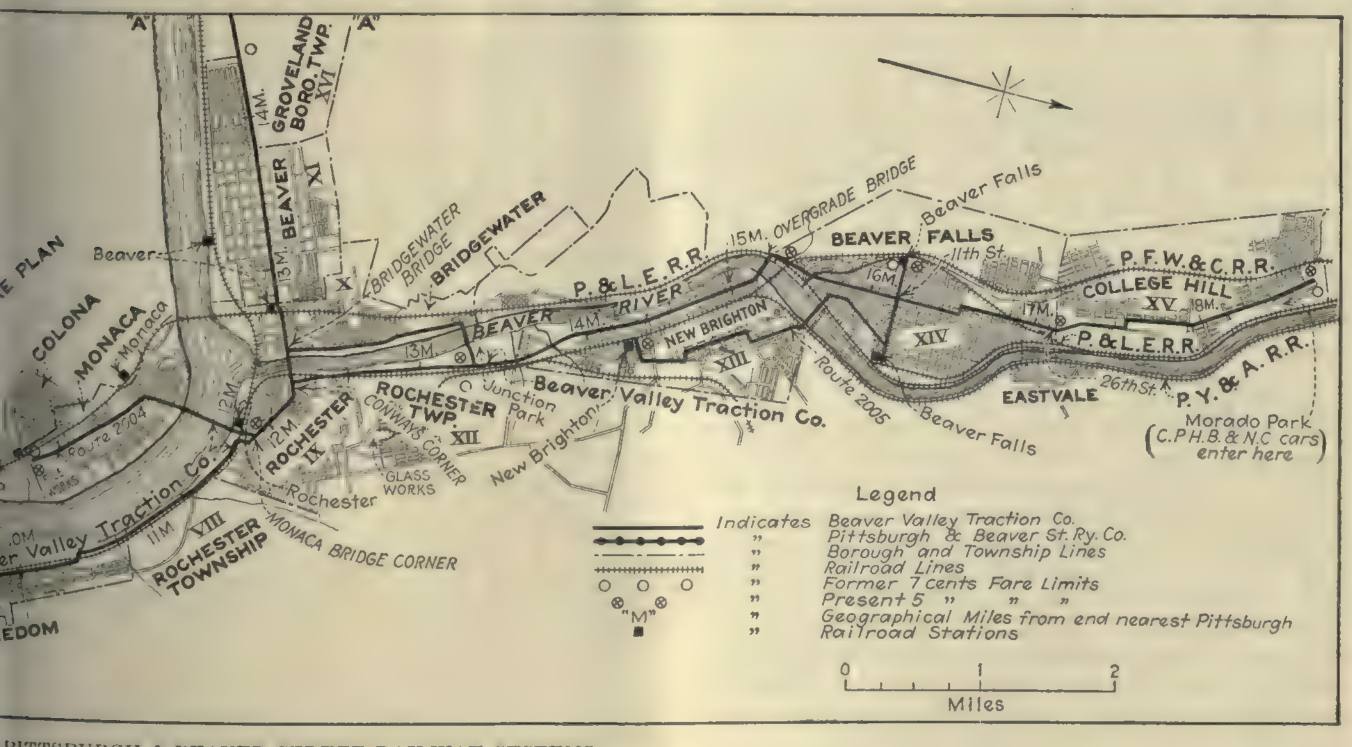
Between College Hill and Vanport—9.5 miles; between Ambridge and Leetsdale; and throughout Rochester and Monaca the company is giving a ten-minute car service; on the Riverview division between Beaver Falls and New Brighton fifteen-minute service and on the remainder of the system a twenty-minute service. With the arrival of more safety cars this headway will be shortened so as to give from 50 to 100 per cent more service.

A real millstone around the neck of the management is the Pittsburgh & Beaver Street Railway, from Leetsdale to Baden, an 8.5-mile double-track route, built fourteen years ago as a link between the Beaver Valley Traction Company and Pittsburgh. Even today the total population served is within 15,000—yet at the time of construction there were only 4,000 people to cater to! A remaining gap of 1.75 miles still prevents the long-planned connection with Pittsburgh.

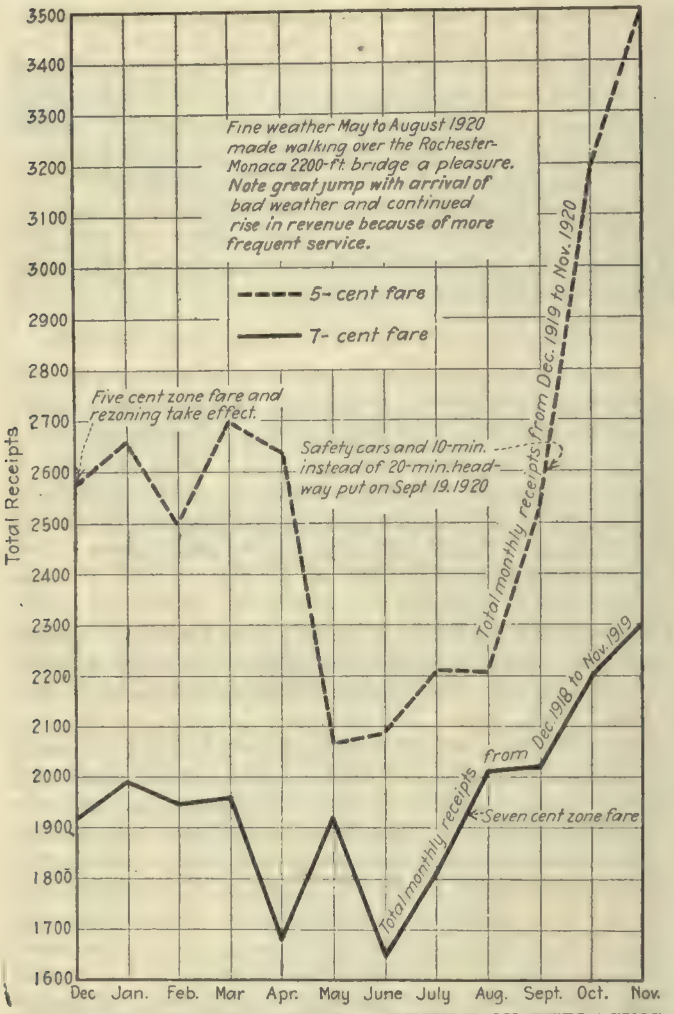
PASSENGER-QUIZ SURVEY PRECEDED FARE CHANGE

As the 7-cent base fare for zones up to 6 miles was not producing the revenue, Mr. Boyce determined to make a survey with the thought in mind of securing more revenue through the introduction of a lower fare for a reduced distance. During October, 1919, following notices in the local papers, traffic checkers boarded the cars to hand "on and off" slips to the passengers. The public was fully informed as to the object of this survey and co-operated in the most satisfying way. (See ELECTRIC RAILWAY JOURNAL, Nov. 8, 1919.) Checks were also made of pedestrian traffic to secure a basis for figuring on the transformation of walkers into riders.

The net result was the working out of a plan whereby the 5-cent fare was restored, but the zones were cut down to an average of 2 miles. Reference to the map will show that the fare points are not laid out to coincide with geographical miles but in accordance with the natural traffic gathering points. This change, of course, was sufficient to restore the 5-cent fare for most of the intra-community riding, and in some cases even the long rider through the thinnest territory had little more to pay. On the other hand, certain transfer privileges were withdrawn, some 7-cent zones became two or three 5-cent zones, etc. Of course, the people who had to pay more were somewhat vocal about it, but after all it was evident that the majority had no complaints



PITTSBURGH & BEAVER STREET RAILWAY SYSTEMS



ROUTE 2004, SERVING MONACA. RESULT OF REPLACING 7-CENT FARE WITH TRANSFER BY 5-CENT FARE WITHOUT TRANSFER. LENGTH OF ROUTE 1.5 MILES

to make and that there was every reason why the short rider should be pleased. This schedule became effective Dec. 1, 1919. The increase in revenue was figured to be 19 per cent with no cut in patronage.

THE TELEPHONE PROVES A COMPETITOR

Now here is where the rivalry of the telephone comes in. It appears that when the increase in fare was made, those who were most unfavorably affected by it found that they could do a lot more shopping and visiting by telephone. Inquiry by the company showed that for the first three months of the fare increase (December, 1919, January and February, 1920) the telephone load throughout the district had increased about 35 per cent. On the other hand, the telephone load for March, 1920, showed a decrease of 10 per cent compared with the preceding three months' period. In short, as one class of business went up the other went down. The advent of winter probably was also a factor; but the opposing fluctuations do indicate some rivalry between the two methods of communication.

An analysis of the accompanying charts showing both monthly and twelve-month figures for the combined property indicates that the service rendered varied but little during the past five years, notwithstanding that the various fare increases did for a time create a considerable traffic loss until merchandising methods were established to sell the wares of the company in quantities that were acceptable to the public.

When this became a fact on Dec. 1, 1919, and fares were based on 5 cents per 2-mile zone business took a boom and more passengers rode than ever before. This is especially shown by the route diagrams hereafter mentioned. Then, with the careful study of developing the riding habit on certain routes and giving better service on a more frequent headway with new and up-to-date cars, the results longed for in the past with high zone fares actually became a realization.

The result of the various fare changes for the past five years is given in Table I. From this table it will be noted that in 1920 there were fifteen zones as against seven when the previous 5-cent-zone fares were in effect. An increase of 59.8 per cent in revenue zone passengers at the expense of a 32.1 per cent decrease in free and transfer passengers indicates that the lower base fare picked up many a short-haul passenger. This perhaps is better shown by the fact that in 1916 the average fare per zone passenger carried was but 4.06 cents, while in 1920 it was 4.60 cents, a gain of 13.3 per cent. The elimination of reduced-rate tickets also had something to do with bringing about this increase. Taking the gain of 2.68 per cent in the average fare per revenue zone passenger from the 13.3 per cent would leave a gain of more than 10 per cent that could be attributed to additional business that brought a gain of 64.6 per cent in the car-mile passenger revenue.

TABLE I—STATISTICS AS TO VARIOUS FARE SCHEDULES

Rates of Fare per Zone	8 Mos. Ended Aug. 31, 1916 5c. Cash 100/4.50 Full Fare Ticket ½ Fare Labor Ticket, ½ Fare School Ticket	Sept. 1, 1916, to Jan. 26, 1918. 5c. Cash, 21/100 Full Fare Ticket	Jan. 26, 1918, to Sept. 5, 1918, 6c. Cash	Sept. 5, 1918, to Dec. 1, 1919 7c. Cash	Dec. 1, 1919, to Dec. 31, 1920, 5c. Cash	Per Cent Increase 1920 over 1916 Plan
Number of fare zones	7	7	7	7	15	......
Avg. length of zones, miles	3–6	3–6	3–6	3–6	2.0	......
Car-mile statistics:						
Passenger revenue, cents	27.1	30.1	31.4	37.3	44.6	+64.6
Revenue zone passengers	5.6	6.11	5.49	5.40	8.95	+59.8
Free and transfer zone passengers	1.09	1.11	1.03	1.025	0.74	—32.1
Total zone passengers	6.69	7.22	6.52	6.425	9.69	+44.8
Average fare per rev. zone passenger, cents	4.85	4.925	5.75	6.94	4.98	+ 2.68
Average fare per total zone passenger carried, cents	4.06	4.16	4.85	5.83	4.60	+13.30

NOTES ON TRAFFIC SURVEY THAT LED TO FIVE-CENT ZONES

As a start, the system was divided into thirty-two sections. These divisions were not made arbitrarily upon a mileage basis as their length varied from 0.25 to 2 miles, but with consideration to the actual and possible traffic movement within the most natural boundaries. Then the actual "on and off" traffic in each section was plotted as of Oct. 2, 1919. To these sections there were next applied ten different fare schedules, ranging from 3-cent zones averaging 1.5 miles each to 10-cent zones averaging 3 miles each. A summary of eight of these schemes and what could be expected from each if there was no drop in traffic follows:

Plan 1. Ten-cent zone fare with no transfers, with passenger receiving two zone checks, whereby the actual rate was three zones for 10 cents or 3⅓ cents per zone. This plan would have decreased the revenue by approximately 4 per cent.

Plan 2. Same fare zones as Plan 1 but with 6 cents for first zone and 2 cents for each additional zone. Expected increase in revenue, 2.86 per cent.

Plan 3. Then existing fare zones, averaging 3 to 6 miles. Straight 10-cent zone fare, except that 15 cents would be charged for through passengers passing Junction Park. Fare in Riverview, Monaca and Sharon to be 5 cents without transfer.

Plan 4. Then existing fare zones, averaging 3 to 6 miles. Straight 8-cent zone fare, but with 5-cent non-transfer fare in Riverview, Monaca and Sharon; rest of routes, 8 cents per zone. Expected increase, 11.1 per cent.

Plan 5. Straight zone fare of 7.5 cents with new fare zones, averaging 2 to 3 miles. No transfers in Riverview and Monaca. Expected increase, 42.3 per cent.

Plan 6. Same as Plan 5 except for two shiftings in fare points at Beaver and Rochester. Expected increase, 44.9 per cent.

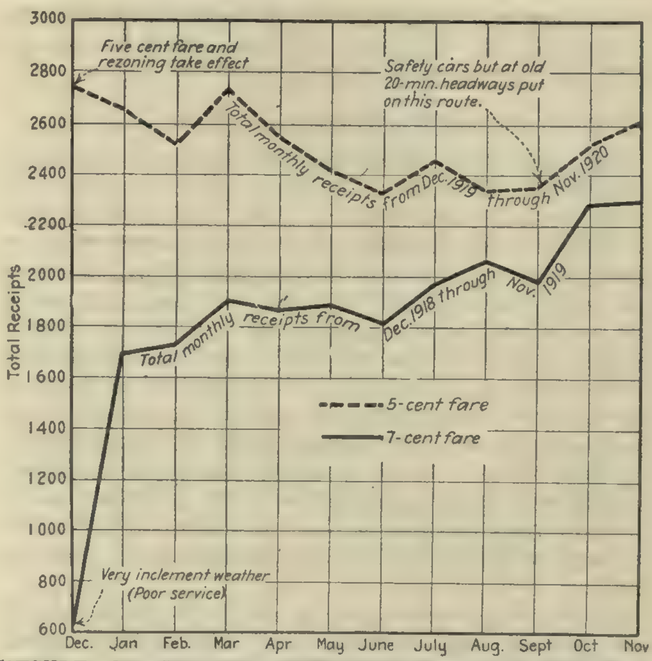
Plan 7. Five-cent zone fare with zones shortened to an average of 2 miles with transfer privileges continued. Expected increase, 12.52 per cent.

Plan 8, as proposed and adopted. Five-cent zone fare with zones averaging 2 miles as in Plan 8, but with transfers eliminated on the Monaca division and modified on the Riverview division. Expected increase, 19 per cent.

Plan 9 was a straight 10-cent fare with zones averaging 3 miles. The theoretical increase in revenue was figured to be 50 per cent.

Earlier Increases Showed Wisdom of Keeping Five-Cent Fare on Short Lines at Least

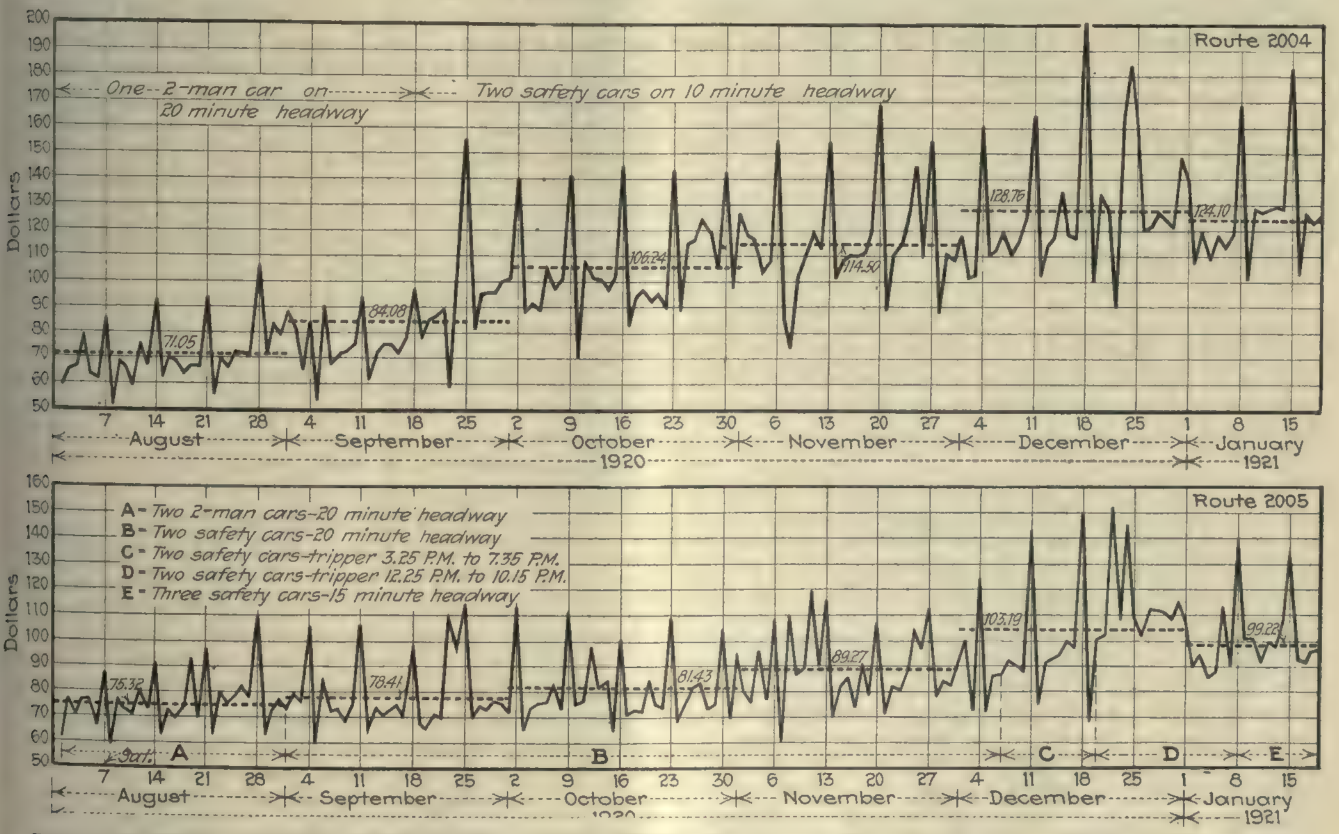
In coming to his deductions favoring short 5-cent zones, Mr. Boyce had two statistical bases to go by in addition to his intimate knowledge of the territory. The first of these bases was the traffic survey of Oct. 2, 1919, and the other the results which had followed the earlier fare increases.



RESULT OF SERVICE BETTERMENT ON ROUTE 2005, RIVERVIEW CROSSTOWN LINE, 2.7 MILES IN LENGTH, CONNECTING NEW BRIGHTON AND BEAVER FALLS FOR A 5-CENT FARE, WHEREAS THE MAIN LINE FARE IS 10 CENTS

The results of the traffic survey, segregated by the nine 7-cent zones, marked on the map showed clearly how dependent the company was on the short-haul riders. Analysis showed that more than 50 per cent of the passengers rode less than what are now two 5-cent zones.

A further increase in the base rate of fare which was then 7 cents might have been disastrous, due to traffic losses, whereas a shortening of the fare zone with



DAILY RECEIPTS ON TWO SINGLE-ZONE ROUTES FROM AUG. 1, 1920, TO JAN. 19, 1921, SHOWING HOW MORE FREQUENT SERVICE INCREASES PASSENGER REVENUES a corresponding reduction in the base rate might be advantageous in retaining the present riders and at the same time creating new traffic.

WHAT OCCURRED WITH EARLIER FARE CHANGES

The results from the earlier fare changes in the order of their occurrence follows:

First change—On Sept. 1, 1916, the labor tickets, so called, which provided a 10-cent ride for 5 cents during certain hours and the full fare tickets that had been sold in lots of 100 for $4.50 were abolished and a new ticket was put on sale at the rate of 21 for $1. Roughly speaking, the 4.5-cent zone fare ticket was succeeded by a 4.7-cent rate. No change was made in the cash fare, which still remained at 5 cents with free transfers, nor was any change made in the length of the fare zones. From a traffic standpoint the first month's operations compared with the previous month showed a gain in revenue zone passenger traffic of 2.22 per cent, although the revenues increased but 4.35 per cent.

Second change—On Jan. 26, 1918, the base rate of fare per zone was increased to 6 cents and all tickets abolished. No change was made in transfer privileges nor in zone lengths. For the property as a whole, the results of the first month's operation under this fare increase showed a 2.34 per cent loss in the number of revenue zone passengers carried but a gain in revenue of 14.95 per cent.

Third change—On Sept. 6, 1918, the zone base rate of fare was further increased to 7 cents. No change, however, was made in transfer privileges or zone limits. A comparison of the first month's operations with the previous month shows that again there was no appreciable change in the number of revenue zone passengers carried. The corresponding change in revenue was 10.58 per cent. Looked at in a different light, the company was carrying in September, 1918, daily an average of 25,523 revenue zone passengers at 7 cents per zone as against 21,445 prior to the first change in fares, Sept. 1, 1916. However, as there had been a 75 per cent increase in fare for a portion of the car riders in the same period the average daily receipts jumped from $1,032.54 to $1,339.89, or 29.8 per cent.

TABLE II—RESULTS OF TRAFFIC SURVEY BY ZONES

Zones	1	2	3	4	5	6	7	8	9	All
Passengers cn	13,154	2,340	319	87	2	...	..	..	..	15,902
Passengers off	5,510	7,004	2,380	591	208	136	44	25	11	15,909
Total passengers	18,664	9,344	2,699	678	210	136	44	25	11	31,801

Total passengers boarding car within limits of Beaver Falls borough (Twenty-sixth Street to Beaver Falls-Brighton station) who:

Rode to Beaver	387
Rode from New Brighton to Beaver	241

Fourth change—On Dec. 1, 1919, the whole fare scheme was changed as already mentioned, and the length of the zones changed to approximately 2 miles with the base fare set at 5 cents. The immediate results were below expectations. The first month's operations, December, 1919, compared on an average daily basis with November, 1919, showed a gain in revenue of 4.58 per cent. January results were below December and February was slightly better than January. March, however, showed up more nearly the anticipated gain; in other words, 15.1 per cent over the corresponding month of the previous year.

Attention is called to the figures for April, 1920, as compared with April, 1919. The 5-cent fare evidently was creating new riders. The increase in zone passengers on the Beaver Valley Lines was 24.29 per cent and on the Pittsburgh & Beaver Lines was 27.56 per cent. Table III as well as the chart depict clearly the effect of the various fare changes as it influences traffic.

TABLE III—FISCAL AND TRAFFIC RESULTS OF FARE CHANGES, BEAVER VALLEY TRACTION COMPANY ONLY

Daily Averages

Date	Zone Fare	Revenue	Revenue Zone Fares	Transfer and Free Zone Fares	Total Zone Fares	Average Revenue per Car-Mile (Cents)
Aug. 1-31, 1916	(a) 5c	$1,033	21,445	4,807	26,252	28 9
Sept. 1-30, 1916	(d) 5c	1,078	21,923	4,613	26,536	30 0
Per cent change	0.0	+4.35	+2.22	—4.03	+1.08	+3.81
Dec. 26, 1917, to Jan. 25, 1918	(b) 5c	$913	18,911	2,806	21,717	......
Jan. 26, 1918, to Feb. 25, 1918	6c	1,049	18,468	3,203	21,671	......
Per cent change	+20.0	+14.95	—2.34	+14.18	—0.21	......
Aug. 6, 1918, to Sept. 5, 1918	6c	$1,212	20,519	4,382	24,901	......
Sept. 6, 1918, to Oct. 5, 1918	7c	1,340	20,523	4,030	24,553	......
Per cent change	+16.66	+10.58	0.00	+12.42	+14.00	......
Nov. 1, 1919 to Nov. 30, 1919 (c)	7c	1,637	23,420	4,380	28,800	39.8
Dec. 1, 1919, to Dec. 31, 1919 ( )	( ) 5c	1,712	34,455	2,945	37,400	41.1
Per cent change	—28.6	+4.58	+ 46.8	—30.4	+29.82	+3.27

(a) 4½-cent ticket and a two-zone labor ticket for 5 cents are also sold.
(b) 5-zone zones—2 miles average length.
(c) Figures include Pittsburgh & Beaver Street Railway.
(d) Reduced rate zone tickets sold twenty-one for $1.

HOW FARE INCREASES AFFECT THE SHORT HAUL TRAFFIC

A specific proof of the value of adhering to the 5-cent fare as a unit for a short-distance ride when the transfer can be practically eliminated is afforded by a study of the Monaca Route 2004 and the Riverview Crosstown Route 2005, which are respectively 1.5 miles and 2.7 miles long. Even on the latter line most of the riding is done within a haul of 1.25 to 1.5 miles, so that the combination of a twenty-minute headway and a more-than-nickel fare was too great a temptation to walk.

The graphs on pages 672 and 673 show daily and monthly revenues for both routes and are good indices of results obtained by reducing fares for building up short-haul traffic. Tables IV and V also give an idea of what high minimum fares mean on routes when the average length of ride is but little more than a mile.

On Route 2004—between Monaca and Rochester—where the bulk of the riding is one mile or less, the effect of the elimination of labor tickets and the 4½-cent zone ticket caused a loss of 10.52 per cent in total passengers and a 4.46 per cent in revenue. (Even a quarter of a cent increase in fare may loom big to the patron.) The change from 5-cent zones to 6-cent zones in 1918 showed a further decrease in the revenue passengers carried, but due to a 17.5 per cent increase in transfers collected, the traffic handled by the route increased 2.67 per cent and the 20 per cent increase in fare netted an increase of 10.03 per cent in revenue.

The 7-cent fare which became effective in September, 1918, caused losses in total traffic handled of 6.31 per cent, although an increase of 7.08 per cent in revenue was obtained. This loss, however, was greatest in the number of revenue zone passengers carried, which decreased 9.4 per cent. On Dec. 1, 1919, the 7-cent fare with free transfer privilege was reduced to a straight 5-cent zone fare without transfers. This reduction in fare alone stimulated riding as is shown on both charts. Monthly revenues increased from 35 to 40 per cent over the previous year, while the daily revenues showed a corresponding upward tendency from the day of the 5-cent fare. In September safety cars supplanted the

TABLE IV—EFFECT OF FARE INCREASES ON TRAFFIC—ROUTE 2004

Daily Averages

Date	Zone Fares	Revenue	Revenue Zone Fares	Transfer and Free Zone Fares	Total Zone Fares	Average Revenue per Car-Mile (Cents)
Aug. 1—31, 1916..	(*a*) 5c	$60.60	1,230	655	1,885	36.04
Sept. 1—30, 1916..	(*b*) 5c	57.90	1,160	527	1,687	34.71
Per cent change...	......	—4.46	—5.68	—19.58	—10.52	—3.15
Dec. 26, 1917 to Jan. 25, 1918....	(*b*) 5c	$51.69	1,035	349	1,384	......
Jan. 26, 1918 to Feb. 25, 1918....	6c	56.88	1,011	410	1,421	......
Per cent change...	+20.0	+10.03	—2.32	+17.5	+2.67	......
Aug. 6, 1918 to Sept. 5, 1918....	6c	$53.05	926	486	1,412	31.82
Sept. 6. 1918 to Oct. 5, 1918.....	7c	56.81	839	484	1,323	34.17
Per cent change...	+16.67	+7.08	—9.40	—0.50	—6.31	+7.37
Nov. 1—30, 1919..	7c	$76.60	1,101	522	1,623	46 51
Dec. 1—31, 1919..	5c	83.10	1,661	7	1,670	49 86
Per cent change...	—28.6	+8.48	+50.86	—98.66	+2.89	+7.20

(*a*) A 4½-cent and a two-zone labor ticket for 5 cents are also accepted for fare.
(*b*) Reduced rate zone tickets sold twenty-one for $1.

two-man cars, with the headway cut in half. This improved service still further increased the traffic so that revenues in October, 1920, the first whole month of safety car operation, were 51 per cent more than the previous year. In December, 1920, the business depression became a factor, due to the industries in the territory served laying off about 27 per cent of their forces. Nevertheless the frequent service in dull times brought more traffic than the longer headways in good times.

Route 2005, although called a crosstown line, is really a roundabout route between New Brighton and Beaver Falls, starting at about the middle of New Brighton (Fourteenth Street) and running to Beaver Falls via Eleventh Street, which is the chief business street of that town.

Similar figures are also given in Table V for Route 2005—the so-called Crosstown Riverview Line. A comparison of the results on these two routes shows conclusively that as fares are increased the traffic losses very often are such that the actual results are not as anticipated. In other words, compared with the traffic handled prior to any change in fares in 1916—and that during the 7-cent fare period—the loss in traffic amounts to 29.82 per cent on Route 2004 and to 22.62 per cent on 2005, while from the revenue standpoint on Route 2004 there is a loss of 6.26 per cent, and on Route 2005 the gain is but 1.14 per cent.

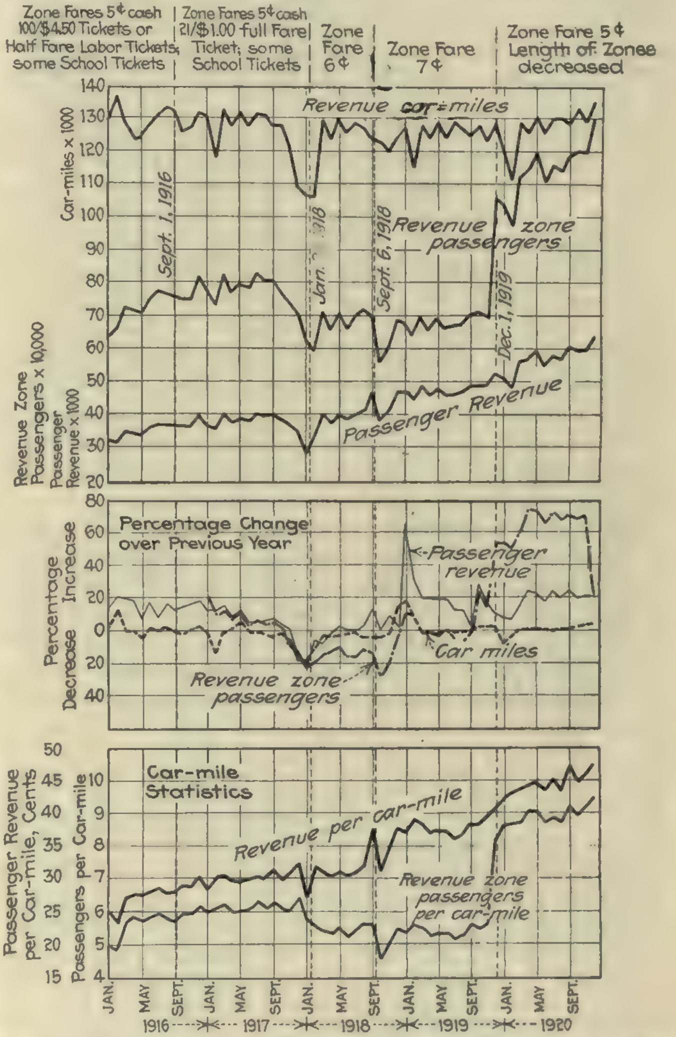
The increased revenue resulting on this route is due not only to the change in fare and improved service but to the fact that with the establishment of the 2-mile 5-cent zones the fare via the main line between New Brighton and Beaver Falls was made 10 cents, and but 5 cents via the roundabout or crosstown line. Thus for January, 1920, as shown on the graph, revenues had increased 56 per cent over the corresponding year, without any improvement being made in the service. This was equivalent to a gain of 95 per cent in traffic. Unfortunately this gain is not stable but decreased month by month until in June, 1920, when the gain over the preceding year was but 14 per cent. Safety car service was installed in September, 1920—with no change in headway. The effect on revenues was an increase of 4.1 per cent in September, 3.86 per cent in October and 9.62 per cent in November over the respective preceding months. In December a tripper was added to the service during the rush hours, which further increased the average daily revenue 15.6 per cent over the month of November. To prove that holiday traffic solely was not the cause of this large increase attention is called to the fact that in January, 1921, the average daily revenue based on the first nineteen days was $99.22. This, then, is equivalent to 11.12 per cent gain over November. However, in January three safety cars were operating on a fifteen-minute normal headway as against a base schedule of twenty minutes and fifteen minutes in the rush hour with trippers in November and December.

TABLE V—SHOWING EFFECT OF FARE INCREASES ON TRAFFIC—ROUTE 2005

Daily Averages

Date	Zone Fares	Revenue	Revenue Zone Fares	Transfer and Free Zone Fares	Total Zone Fares	Average Revenue per Car-Mile (Cents)
Aug. 1-31, 1916...	(*a*) 5c	$54.32	1,103	187	1,290	18.71
Sept. 1-30, 1916...	(*b*) 5c	50.73	1,024	172	1,196	17.74
Per cent change...	......	—6.60	—7.17	—8.03	—7.28	—5.17
Dec. 26, 1917 to Jan. 25, 1918....	(*b*) 5c	$60.16	1,201	108	1,309	......
Jan. 26, 1918 to Feb. 25, 1918....	6c	64.43	1,033	95	1,128	......
Per cent change...	+20.0	+7.11	—13.98	—12.02	—13.82	......
Aug. 6, 1918 to Sept. 5, 1918....	6c	$57.77	981	160	1,141	19.96
Sept. 6, 1918 to Oct. 5, 1918.....	7c	54.94	835	163	998	18.77
Per cent change...	+16.67	—4.91	—17.5	+1.87	—12.55	—5.96
Nov. 1-30, 1919...	7c	$76.23	1 098	145	1,233	26 67
Dec. 1-31, 1919....	5c	84.25	1 769	77	1 840	30 59
Per cent change...	—28.6	+10.52	+61.11	—46.89	†49.2	+14.69

(*a*) A 4½-cent and a two-zone labor ticket for 5 cents are also accepted for fare.
(*b*) Reduced rate zone tickets sold twenty-one for $1.



MONTHLY STATISTICS SHOWING EFFECT OF FIVE FARE INCREASES AS APPLIED TO THE WHOLE SYSTEM

From the figures in Tables IV, V and VI it is evident

TABLE VI—RESULTS UNDER FIVE-CENT ZONE FARE

Daily Averages—Route 2004

Date	Zone Fare	Revenue	Revenue Zone Fares	Transfer and Free Zone Fares	Total Zone Passenger
Jan. 1920	5c	$86.11	1,726	None	1,726
Jan. 1919	7c	62.91	918	427	1,345
Per cent change	..	+36.9	+88.2	......	+28.22
Aug. 1920	5c	$71.05	1,430	None	1,430
Aug. 1919	7c	165.27	931	518	1,449
Per cent change	..	+8.86	+53.7	......	—1.27
Oct. 1920	5c	$106.24	2,125	None	2,125
Oct. 1919	7c	70.91	1,016	492	1,508
Per cent change	..	+49.8	+102.2	......	+29.0
Daily Averages—Route 2005					
Jan. 1920	5c	$85.80	1,716	101	1,817
Jan. 1919	7c	56.13	783	129	912
Per cent change	..	+53.0	+119.0	—21.65	+99.2
Aug. 1920	5c	$75.32	1,522	229	1,751
Aug. 1919	7c	66.61	953	150	1,103
Per cent change	..	+13.08	+59.7	+52.7	+58.6
Oct. 1920	5c	$81.43	1,621	64	1,685
Oct. 1919	7c	73.81	1,059	146	1,205
Per cent change	..	+10.34	+53.2	—56.2	+39.8

that for the short routes under consideration the 5-cent fare is bringing the largest amount of revenue from the largest number of patrons. The Beaver Valley 5-cent short-zone fare scheme was one that took the individual peculiarities of the different routes into consideration instead of applying some one blanket change and consequently the results have proved so gratifying. A significant phenomenon is that the losses in traffic during the various cash-rate increases occurred chiefly during the months of fair weather, and this fair weather traffic did not tend to come back. In other words, had the company gone to higher and higher cash fares its usefulness would have dwindled to the point of carrying only the compulsory maximum-distance rider.

As another example of this tendency it may be pointed out that on the Pittsburgh & Beaver Railway the winter increase, Jan. 26, 1918, from 5 cents to 6 cents, caused no diminution in traffic, whereas the summer change, Sept. 6, 1918, from 6 cents to 7 cents, caused so large a drop in traffic as to produce less revenue comparing the month before and the month after the change in rates.

As a matter of both fairness and good business the company is willing to split the nickel for customers who have to pass through a short terminal zone. Thus on the 0.73-mile terminal zone between Sassafras Alley, Beaver and Ferry St., Vanport, only 2½ cents is charged, although the tariff calls for 5 cents. In addition to benefiting the passenger who has already paid for one or more 5-cent zones, the company is getting out a 5-cent round-trip ticket for local traffic. This particular stretch is to be paved next year and it will then become a more attractive residential section. The management, in its usual forehanded way, is doing its share to attract new residents by means of the 2.5-cent rate; and when the time is ripe it will give a 10-minute through service instead of turning back half the cars at Ferry Street, Vanport.

Another interesting possibility is that of the Overgrade Bridge between New Brighton and Beaver Falls. The company charges a 2-cent toll for walking over this privately-owned bridge but contemplates a 2½-cent car rate, as this might induce some riders to go on into the next 5-cent zone.

POTENTIAL CUSTOMERS FAR OUTNUMBER THE ACTUAL RIDERS

The foregoing data have demonstrated that the development of differential short-ride fares has increased both traffic and revenue on the system as a whole, and that the increase in service on the short routes have also been a factor in the same direction. The question that remains is: How many more riders can the railway obtain eventually if fares and service are right in the eyes of the public?

To this end several checks of pedestrian and automobile traffic have been made and changes noted in addition to the fluctuations in telephone traffic as noted hereinbefore. In a check made during 1919 at various bridges the thought-provoking figures totaled in Table VII were obtained.

The traffic check on the Tenth Street bridge between Beaver Falls and New Brighton showed that the pedestrian traffic was about double and the automobile passengers about five times the number of street cars users. Naturally, not all of these are street car prospects, but it will be admitted that here is something to work on! The traffic checks on the other bridges do not show up the street railway so badly, but here, too, there are possible customers for the electric railway.

The jitney traffic over the Monaca Bridge is not really a competitor, as it is operated chiefly for the greater convenience of residents of Colona (beyond the terminus of the Monaca Line). A check of the competing Ambridge jitney service made on Friday, Sept. 12, 1919, showed 179 northbound and 192 southbound passengers between 6 a.m. and 7:25 p.m. No complaint has been made by the company concerning this competition, nor will it be necessary, for the improved service is driving them out of business.

In addition to the checks of bridge traffic noted, the management has had an eye upon traffic to and from the steam railroad stations. Frequent traffic checks are made to these points to determine what percentage of the travelers arrive at the depots by trolley. One check recently taken showed that at the Beaver Falls station the trolleys carried 38 per cent of the traffic and that at the Beaver station did 31.6 per cent of the handling.

TABLE VII—CHECKS OF BRIDGE TRAFFIC, BEAVER VALLEY TRACTION COMPANY

	Northbound					Southbound				
Tenth Street Bridge	Car		Auto	Truck	Foot	Car		Auto	Truck	Foot
Thursday, Sept. 4, 6:30 a.m. to 11 p.m.	361		1628	414	661	338		1746	371	692
Friday, Sept. 5, 6:30 a.m. to 10 p.m.	301		1607	509	759	367		2068	530	673
Bridgewater Bridge	Eastbound					Westbound				
Wednesday, Sept. 10, 6 a.m. to 10 p.m.	1678		1629	236	[illegible]	1599		1556	254	736
Thursday, Sept. 11, 6 a.m. to 9 p.m.	1454		1449	245	681	1346		1468	214	711
	Northbound					Southbound				
Monaca Bridge	Car	Jitney	Auto	Truck	Foot	Car	Jitney	Auto	Truck	Foot
Monday, Sept. 8, 6 a.m. to 10 p.m.	609	135	658	166	631	667	165	608	168	581
Tuesday, Sept. 9, 6 a.m. to 10 p.m.	626	168	644	152	561	676	151	685	146	544
Overgrade Bridge	Total Pedestrians Only									
Wednesday, Sept. 10, 6 a.m. to 11 p.m.	470									
Thursday, Sept. 11, 6 a.m. to 11 p.m.	550									

Street Railway Rate Tariff*

Failure to Allow Proper Base Rates of Fare Results in Practical Confiscation of Railway Property—High Fares Mean More Money Although a Loss in Traffic — Rate of Return Should Exceed the Mere Cost of Money in Order to Allow for Contingencies in the Future

By W. H. SAWYER
President East St. Louis (Ill.) & Suburban Railway

THERE is no particular form or kind of rate schedule which should be seriously proposed for national adoption. Our standard previous to the war was a rate schedule of 5 cents, with the lowest ticket rate and the longest ride possible and still keep wheels turning. Due to this national standard most of us were facing ruin without fully appreciating the situation.

During the past three years municipal authorities have offered in most instances vigorous objection to rate schedules put forward by the railway companies, but in the final analysis their objections were based upon a human but selfish desire to secure needed service at an unfairly low price. In such instances it was necessary that the company make a fight. Few of us are by nature belligerents or looking for a fight. Many of us were criticised because we did fight openly for that which we knew to be right, but when history is written we will be given credit for having saved an essential industry.

PROPERTY HAS BEEN CONFISCATED

Actual statistics regarding the public utility industry are available to the public in complete detail—much more completely than for any other industry. These statistics prove that, on the average, street railway rates, during the war, were such that the properties were actually confiscated. Do not regard this statement as just my opinion. I state it as a fact proved by the statistics. And by "confiscated" I mean that we not only did not secure a "fair return on a fair value," but that from a legal, technical, practical, or moral standpoint our properties as a class were actually confiscated. No street railway in the whole country had rates during the war that produced a really "fair return on a fair value."

As a result, therefore, we emerged from the war broken down in credit, with our properties under-maintained and without the ability properly to serve. Practically every street railway man throughout this country is asking today that past confiscatory conditions be rectified, that there be at least a partial recognition of the splendid service which has been given under most adverse conditions; asking, in short, for a rate of fare and service conditions which will entitle him to the financial credit which is due him, not only to equalize the past inequalities, but primarily so that we may continue to carry forward in the future.

The necessity of establishing and maintaining this credit is of primary importance in any rate discussion. We all want to do that which should be done, but unless a rate carries with it real financial credit, as other business men interpret credit, our hands are tied and we are powerless to "carry on" and serve.

Cleveland's pre-war charge was 3 cents; today on an actual comparative basis, making under a service-at-cost plan the same percentage return, Cleveland is charging double 3 cents or 6 cents. There is no escaping the fact that in Cleveland at least it was necessary actually to more than double the gross revenue in order to obtain the same net income, whereas, if the costs of money were to be taken into account, Cleveland stockholders should be entitled to a net income 50 per cent in excess of the percentage obtaining pre-war.

TEN-CENT BASE RATE NOT TOO HIGH

To meet the needs of the communities served a 10-cent straight fare is not too much today for the average electric railway. Instead of being kept from so charging it would be a real blessing to the communities served if the majority of the electric railways of this country were today on a 10-cent straight fare basis. Those flat-fare cities not on a straight 10-cent basis should, in my personal opinion, be on a basis of 10-cent cash fare with reduced ticket rate. With the idea in mind that investigation regarding cities now charging 10 cents was very pertinent the information bureau of the American Electric Railway Association has within the last few weeks turned over to me answers to revised questionnaire sent out to all of the 123 10-cent cities. One important question asked in the questionnaire was: "In your opinion what was the effect upon traffic of putting into effect a 10-cent fare?" Only three companies reported a decrease in traffic of over 15 per cent due to an increase in fare to 10 cents, and two out of three of those companies jumped from 5 cents direct to 10 cents. Approximately 25 per cent of the companies reported no noticeable decrease whatever. The remainder showed a decrease of from 5 to 15 per cent, and the general average showed that the decrease in traffic due to increasing fare to 10 cents was about 8 per cent, certainly under 10 per cent.

In answer to the question, "Taking everything into consideration, are you better off with a 10-cent fare than if the old rate had remained in force?" the answer was 100 per cent "Yes." Some of them seemed to think we were asking a foolish question; they not only said "yes" but they said "certainly," "assuredly," "unquestionably," "definitely," in fact, all kinds of adjectives; there was no question in their minds. In other words, there is not a city in the country that is charging 10 cents but what needed that 10 cents and but what is getting more revenue than it would at any lower figure.

In the answer to these two questions we get indisputable evidence that a higher rate of fare does produce more revenue, thus giving a finality to all previously submitted facts; that unfair, strawman bugaboo, that a higher rate of fare will not produce more revenue, cannot be flaunted any more. Many a company has been unfairly refused a proper increase due to this excuse being put forth by the politician to prevent fair rates being granted. Commissions have refused increase in rates because, so they said, they had grave doubts as to whether increased rates would give increased revenue.

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*Abstract of paper presented before Wisconsin Electrical Association, Milwaukee, March 24, 1921.

If there are still those who maintain the evidence is either misleading or incorrect, I would ask that they await further statistics from the service-at-cost cities. When the time comes that fares are reduced in Cleveland, Cincinnati, or Youngstown, and the reduced rate of fare produces greater revenue than the higher rate of fare then we will commence to have evidence that a higher fare produces lower revenue.

Please pardon my taking so much time to prove that more money means more money, but this unfair weapon has been used against us in the past and we must not allow it to continue. Please also appreciate that I am not arguing for or against the zone system with reduced fare for reduced length of ride.

SINGLE COIN FARE AND TICKETS URGED

Assuming that some companies do not now actually need a straight 10-cent cash fare, or assuming that the day will come when the majority of the companies will not need a straight 10-cent fare, which is the preferable fare, a 10-cent cash fare with reduced rate tickets or an equivalent fare producing the same revenue in odd cents, with or without reduced ticket rates?

The return of the questionnaire by cities operated at 10 cents, either straight fare or with reduced ticket rate, brought out definitely that every executive with one exception believed from his experience that a 10-cent cash fare with reduced ticket rate was far preferable to an equivalent flat rate fare even without tickets. As a concrete example, they considered it was better for the company and the public to charge 10 cents cash, with four tickets for 30 cents, than it was to charge an equivalent straight fare, which we will assume to be 8 cents; and they, of course, considered it far preferable to charge 10 cents cash with reduced ticket rate than to charge an odd penny straight fare with less reduced ticket rate producing the same revenue. Summing up the fare situation as I glean it from the statistics and also from these questionnaires we find:

1. Zone systems are in successful operation in several places and are more satisfactory in these places to the company and to the public than a flat-fare system producing the same revenue.

2. Zone systems are objectionable to the public in most localities and the primary reason is not that the zone system proposed is inequitable or unfair *per se* but that it is believed to be discriminatory compared with existing flat-rate system under which the communities have been developed.

3. The minimum charge in any zone should not, under present conditions, be less than 5 cents.

4. Increased fare has unquestionably produced more revenue and a reduction in rates of fare will produce less revenue.

5. It is not to be expected that further substantial increases will be granted except in exceptional cases, but even with decreased operating costs the industry cannot give needed services if fares are reduced.

6. The rate of fare should not be kept unnecessarily high so as to force the car rider to pay taxes belonging to the general public. I refer to payments by street railway companies for paving and sprinkling, payments of a percentage of their revenue to the city and to all other payments which would not be a part of the cost of service—if measured by the same standards as other business.

7. In these days of registering fare boxes and of locked box fare boxes, a reduced rate ticket or token fare is, where financially practicable, preferable to the company and to the public.

8. A 10-cent cash fare, a standard coin, with reduced rate ticket or token is preferable to odd penny cash fare, with or without reduced ticket rate, producing the same revenue.

The questionnaire also showed that these executives believed that a 10-cent cash fare with reduced rate ticket was desired by their customers in preference to the lower flat rate odd penny fare.

I have given you the consensus of opinion of the committee on rates of fare of the American Electric Railway Association; I have given you the consensus of opinion of executives with whom I have been in communication throughout the country, but the fact still remains that the American Electric Railway Association as an association has no national code as to fare schedules. Its individual members have different ideas as to how the problems should be worked out in their different localities; that is but right and meet. Different conditions prevail in different cities, and even were the conditions the same, I say again the people have a right not only to the service they desire but to pay for that service in the way they desire to pay, provided they do pay the cost of service, and by cost of service I mean not only the cost of labor and materials and taxes, but the fair cost of the money necessary in the business. The money we return to our security holders will buy no more than the same amount of money accruing to them from other business and so they naturally and rightfully expect a fair return on their street railway investment the same as from any other investment. This they have not secured in the past and they must have it in the future or with credit gone we cannot function.

RATE OF RETURN MUST EXCEED THE COST OF MONEY

Just one more phase of this credit question—that is the question of fair return to street railway security owners.

The investor in the future knows that there are plenty of other opportunities to invest money in really paying investments. He knows by experience that the big portion of street railway investments have in the past not been protected and that the properties have been confiscated. He knows that the street railway investor carried during the war a load so unfair that it would have broken down and put out of business any other but this most essential business. He knows that based on today's earnings the street railway investments as a class are undesirable. He won't be caught again—he will protect himself by investing his money elsewhere unless conditions change.

You and I have no need to worry about our jobs. Any man who can successfully operate an electric railway need have no fear of a position in other fields of industry.

So, "why worry?" The investor can take care of himself; the electric railway men can take care of themselves. Why try to save an industry the credit of which has been allowed to become impaired? Why? Because it is our duty.

You may think you have talked until you were hoarse, written until your arms ached, worked until you were worn out in body and mind, but all the work up to the present has been to salvage existing investments, to protect and continue for the public existing service. Heroic sacrificing work has been done, an essential industry has been saved, but of what avail if allowed only to continue as at present, merely to exist.

New money is needed so that our electric railways may grow and expand to meet the needs of the civic communities which cannot grow and prosper except as the electric railways keep pace with their needs and requirements. Electric railway operators can carry on the good work to a successful completion so that electric railway investments may be sought for and thus make possible the improved service and the improved facilities urgently needed. Electric railway rates must be placed and kept on a basis that are comparative with rates to other business.

"A fair return on a fair value" is all the investor asks, but "a fair return on a fair value" as of today only will not bring real credit. Before a rate of fare is lowered some of the past deficiency in rate of return must be compensated for and there must be some surplus to allow for contingencies in the future. Then will investors have confidence in new electric railway securities.

The rate of fare on an electric railway should be such that:

1. The riding public may be given service which all things considered is satisfactory to them.

2. Fair wages, commensurate with wages in other industries, must be paid.

3. The return to the investor is such that new investors will willingly invest new money in new securities to finance additional facilities and equipment.

The Madison Design of One-Man Car*

BY DUDLEY MONTGOMERY

Vice-President Madison (Wis.) Railways

THE Madison Railways have operated standard Birney safety cars for about two years and have now developed a design of one-man car which is being used in an endeavor to prevent crowding at the front end, which has resulted in considerable delay in operation. Our experience indicates that a 26-in. aisle is the minimum that should be used if free movement of passengers in a car is to be obtained. With any narrower aisle, passengers will not attempt to pass except under necessity.

The new design of car as used in Madison is 4 in. wider and 2 ft. longer than the standard Birney car and has a double-door opening 15 in. wide divided into two passageways by a stanchion. The comparative weight of the car is 17,200 lb., as against 15,800 lb. for the standard car. Three criticisms of the new design which were advanced before construction were its additional weight, cost of heating and loss of fares due to the double-door opening. Tests show that the power consumption per 100 lb. per 100 miles varies from 0.3 kw.-hr. to 0.55 kw.-hr. If the car runs 165 miles a day and has a difference in weight of 1,400 lb., the saving for the lighter car is only about 7 kw.-hr. per day. The heat required in the new car is about 160 kw.-hr. per day of eighteen hours in severe weather. The loss of fares is negligible as the operator is not over 3 ft. from passengers entering at the exit door, and at points of heavy loading stands up to make the fare collection.

So far no criticism has been received to this design of car from the public, railroad commission, council, or railway company's employees. We do not feel that the present double-door arrangement will stop congestion at the front end of the present standard car. The widening of the 22-in. aisle is just as important. I am willing to go as far as possible to accomplish standard construction of cars, but I feel that we must have a car that can be sold to our patrons.

London Companies Organize

Outline of the Comprehensive Scheme of Organization of the London Underground and Allied Companies, with Duties of the Different Departments, Made Effective This Year

A SCHEMATIC diagram of the organization of the Underground Electric Railways of London and allied companies, effective Feb. 1, 1921, is given in the chart on page 680. The organization embraces ten companies as follows: (1) Underground Electric Railways of London, (2) Metropolitan District Railway, (3) London Electric Railway, (4) City & South London Railway, (5) Central London Railway, (6) London General Omnibus Company, (7) London & Suburban Traction Company, (8) Metropolitan Electric Tramways, (9) London United Tramways, (10) South Metropolitan Electric Tramways & Lighting Company. In the outline which follows No. 1 is referred to as the "underground company," 2, 3, 4 and 5 as the "railways," 2, 3, 4, 5 and 6 as the "common fund group," 7 as the "traction company" and 8, 9 and 10 as the "tramways." When no limitation is indicated reference is made to all companies.

There is a single chairman and managing director for the underground company, each of the companies in the common fund group and the traction company. This is the Right Hon. Lord Ashfield. There are separate and distinct chairmen for each of the companies in the tramways group. The assistant managing directors for departments A and B are, in charge of department A, Frank Pick, and in charge of department B, H. E. Blain. A general outline of the duties of the different departments shown in the chart is given below:

Department A.—In charge of an assistant managing director (Frank Pick). This department is charged with responsibility for:

- (a) The accounting, audit and statistical work (common fund companies).
- (b) The determination of fares, rates and charges.
- (c) The development and establishment of routes and services and the co-ordination of traffic facilities.
- (d) The publicity and advertising.
- (e) The purchase and supply of stores and materials and the sale of obsolete stores, spare parts and scrap.
- (f) The legal and parliamentary work.
- (g) Negotiations, arrangements and agreements (subject to any directions of the chairman).

Department B.—In charge of an assistant managing director (H. E. Blain). This department is charged with responsibility for:

- (a) The inspection, adjustment, cleaning and oiling of the rolling stock, lifts and escalators of the railways, with the supervision and control of the depots, yards and sidings.

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*Paper presented before Wisconsin Electrical Association, Milwaukee, March 24, 1921.

(b) The operation of the railways and control of stations.
(c) The supervision and control of the motor omnibuses, with the garages and sheds.
(d) The operation of the system of motor routes and stands.
(e) The preparation and institution of all service and duty schedules.
(f) The work of the chief passenger agent, including the supply and issue of tickets.
(g) The settlement of claims arising out of accidents, all companies (and other claims as may be directed by the chairman).
(h) The review of wages, hours, conditions of service and similar questions affecting the staffs as a whole to secure uniformity and the supervision of welfare work.
(i) Communications with the public arising out of the operation of the companies.
(j) The "safety first" work (all companies).

Department C (Railways).—In charge of the director of construction (railways) (Z. E. Knapp). This department is charged with responsibility for:
(a) The generation and distribution of power, including the control and supervision of the power-house, substations and all equipment used in connection therewith.
(b) The supervision and control of all new works, new construction and new equipment (including constructional works for the omnibus company in consultation with the chief engineer, L. G. O. C.).
(c) The conduct of engineering research and investigation on behalf of the railways.

Department D (Omnibuses).—In charge of a chief engineer (L. G. O. C.) (G. E. Shave). This department is charged with responsibility for:
(a) The renewal of omnibuses and the construction of new and additional omnibuses.
(b) The overhaul and maintenance of omnibuses in the new central depot and in the coach factories.
(c) The licensing of omnibuses and all questions arising thereout.
(d) The central stores.
(e) Engineering research and investigation work in connection with omnibuses.
(f) Fuel research.

Department E (Railways).—In charge of a chief engineer (railways) (A. R. Cooper). This department is charged with responsibility for:
(a) The maintenance and renewal of the railways and their equipment.
(b) The maintenance and renewal of the rolling stock, lifts and escalators used upon the railways.
(c) The maintenance and renewal of all buildings, whether for railways, tramways or motor omnibuses.

The chief engineer is also responsible to the director o construction (railways) for any new works in connectio with existing railways.

Department F (Tramways).—In charge of a general manager (tramways) (C. J. Spencer). This department i charged with responsibility for all questions arising ou of the maintenance and operation of the tramways a defined above under Departments A, B and C, except:
(a) The determination of fares, rates and charges.
(b) The co-ordination of traffic facilities.
(c) The publicity and advertising.
(d) The purchase and supply of stores and materials.
(e) The parliamentary work.
(f) The settlement of claims arising out of accidents.
(g) The maintenance and renewal of buildings, which shall be dealt with in Department A for (a) to (e) inclusive, in Department B for (f), and in Department E for (g), in consultation and agreement with the general manager (tramways).

Department G (Common Fund Group).—In charge of a secretary and treasurer (J. C. Mitchell). This department is charged with responsibility for:
(a) The customary secretarial work of the companies.
(b) The financial work.
(c) The administration of the estates and surplus property of the companies.
(d) The insurance work of all descriptions.
(e) The management on behalf of the companies of the superannuation, pension and other funds instituted by the companies.

Department H (Tramways Group).—In charge of a secretary and treasurer (E. Boys). This department is charged with responsibility for:
(a) The customary secretarial work of the companies.
(b) The financial work.
(c) The administration of the estates and surplus property of the companies.
(d) The insurance work, except national health and unemployment insurance dealt with by the general manager (tramways).
(e) The management on behalf of the companies of the superannuation, pension and other funds instituted by the companies.

Note.—In order to insure co-ordination of methods, this department shall, as far as practicable, be governed by the procedure and requirements laid down for the common fund group.

The purchasing agent in New York for the properties mentioned remains the National Railway Appliance Company, New York.

A pamphlet has been issued giving the duties of the various departments in detail.

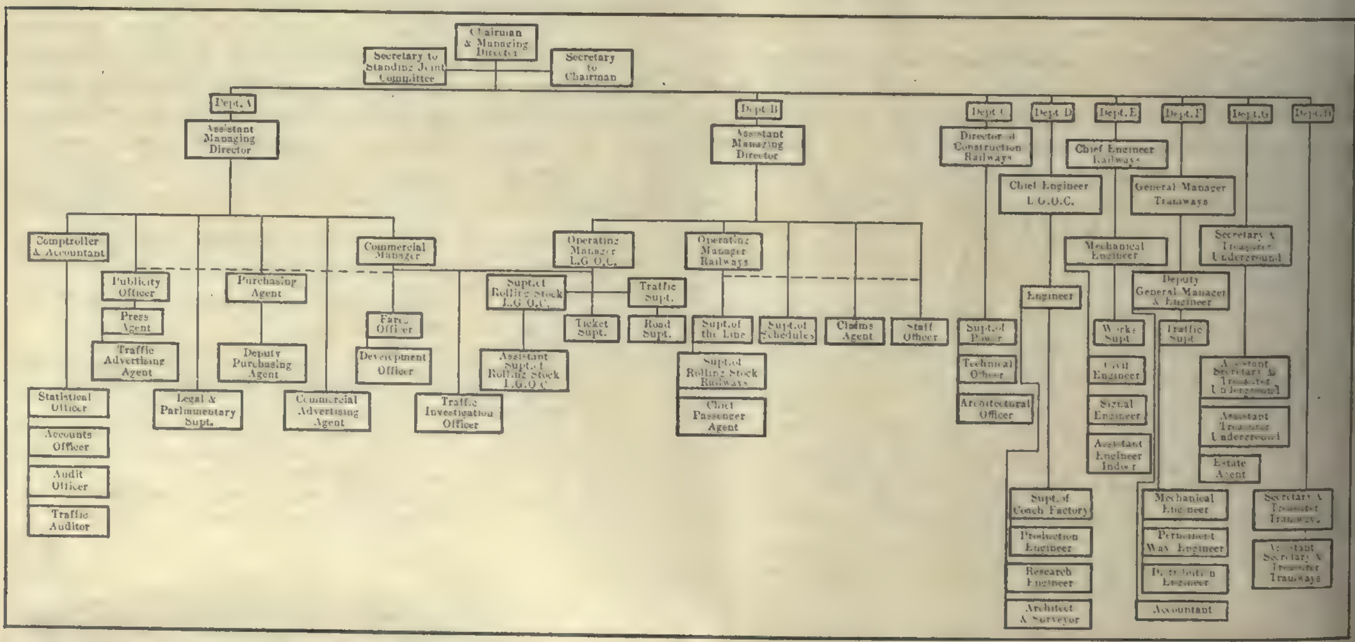
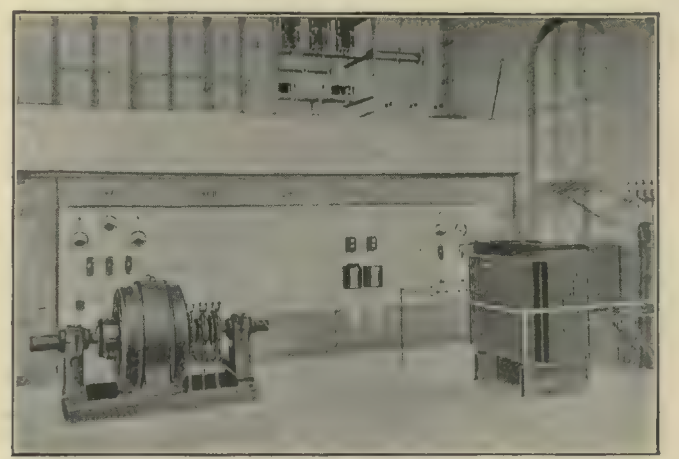


CHART OF ORGANIZATION OF UNDERGROUND ELECTRIC RAILWAYS COMPANY OF LONDON AND AFFILIATED RAILWAY, TRAMWAY AND BUS COMPANIES

RIEHEN AUTOMATIC SUBSTATION, NEAR BASEL



INTERIOR VIEW IN RIEHEN AUTOMATIC SUBSTATION

Automatic Substation in Switzerland

Manufacturers of Electrical Apparatus Have Devised Control to Secure Simplicity, Reliability in Operation and Accessibility for Repair—Devices Differ from Those in Use in This Country, One Feature Being the Provision for Starting and Stopping by Hand and by Time Clock

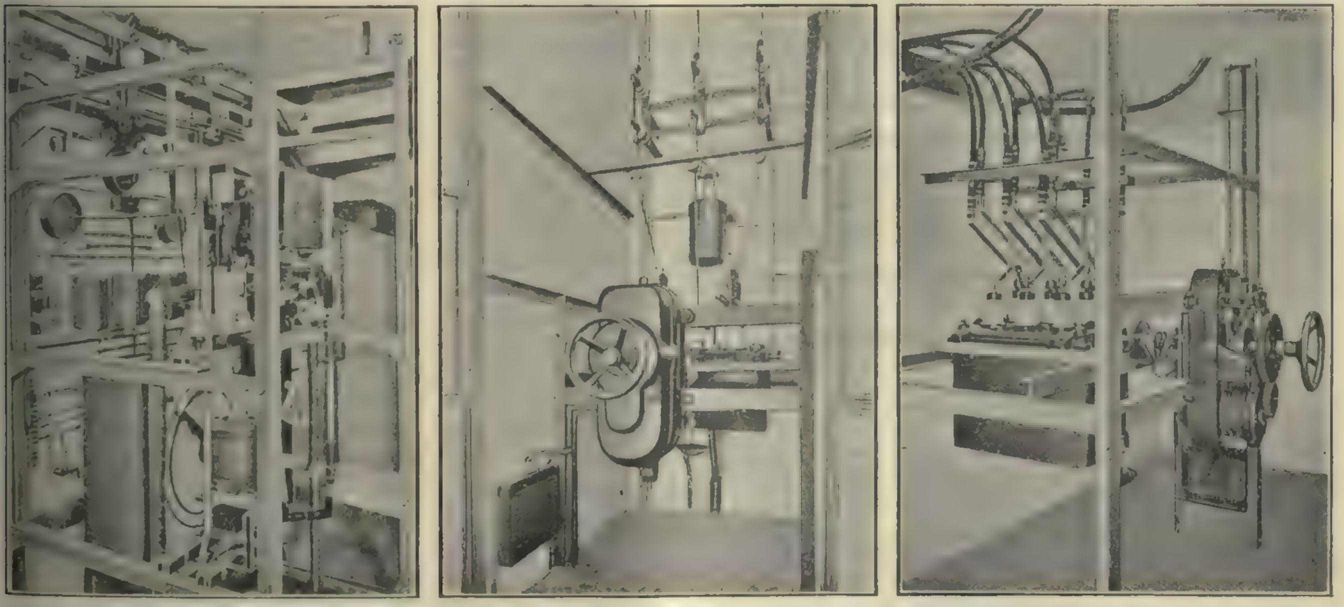
IN VIEW of the wide application in this country of automatic control of electric railway substation apparatus the readers of the ELECTRIC RAILWAY JOURNAL will be interested in developments in the same line abroad. Brown, Boveri & Company of Baden, Switzerland, have installed an equipment of this kind at Riehen near Basel, in a substation which supplies 600-volt power to the electric railway line between Basel and Lorrach, and will later feed certain projected tramway lines. The devices used differ considerably from those usual in this country and they are covered by patents. One salient difference is the provision for starting and stopping by hand and time clock, the control taking care of all operating conditions otherwise.

The Riehen substation is part of the Basel Electricity Works system, and it was built before the decision was reached to put in automatic equipment. It contains a 250-kw., six-phase, 50-cycle rotary converter equipped with a speed-limit device, transformer, regulative reactance coil, starting switch and field rheostats. Provision was made in the design for two additional rotaries of at least 250-kw. capacity each.

This substation secures its power supply from the Augst plant at 6,300 volts.

TIME SWITCH IS USED MORNING AND EVENING

The essential parts of the automatic control equipment are as follows: Time switch for cutting equipment in or out at a predetermined time; transformer and starting switches; switch-operating devices; relays of various kinds, namely, overload, time-limit, polarized, no-voltage, feeder; over-speed centrifugal switch,

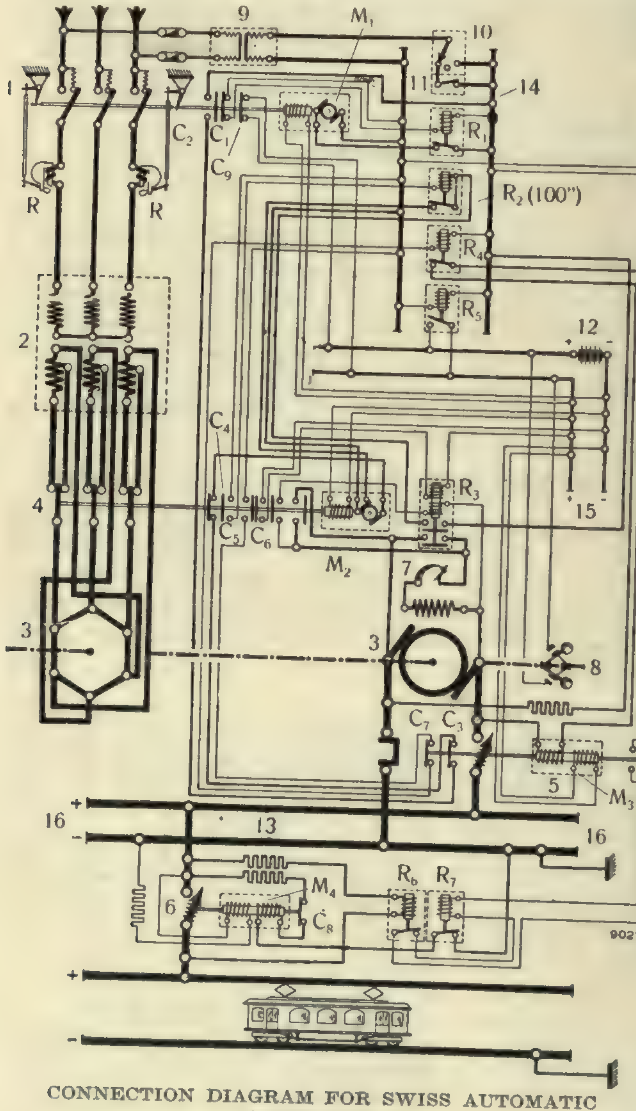


LEFT, SWITCH CELL FOR ONE ROTARY CONVERTER. CENTER, REMOTE-CONTROL MOTOR-OPERATED MECHANISM FOR TRANSFORMER SWITCH. RIGHT, REMOTE-CONTROL MOTOR-OPERATED MECHANISM FOR MAIN ROTARY SWITCH auxiliary battery and, of course, the usual circuit breakers, etc. Essentially these devices are built along standard lines. The operating devices for the heavy switches are motor-driven, solenoid operation being used where sufficiently powerful.

For the operation of the relays and electrical switchgear, special auxiliary sources are required as follows:

A small single-phase transformer connected to the primary winding of the main transformer. To this are connected the operating devices of the alternating current switchgear, the voltage coils of the time-circuit relays and the no-voltage relays.

A small portable storage battery is used for tripping the main switch supplying current to the rotary as well as energizing the coil of the polarized relay during the starting period. The feeder switches have a no-voltage release. The energy for operating the direct current contactors is obtained from the rotary itself. For the first start in the morning and for the shutting down in the evening a simple time switch is used means of which, in starting, the "in" bus is put und pressure, and this in turn energizes the relays in fixed sequence and causes the closing of the correspon ing switches.



CONNECTION DIAGRAM FOR SWISS AUTOMATIC SUBSTATION

1. Transformer primary switch
2. Transformer
3. Synchronous converter
4. Starting switch
5. Machine automatic breaker
6. Feeder automatic breaker
7. Field rheostat
8. Overspeed centrifugal switch
9. Auxiliary transformer
10. Hand switch
11. Time switch
12. Auxiliary battery
13. Resistor
14. Busbar "in"
15. Busbar "out"
16. Station busbar

R = Overload relay
R_1, R_2, R_4, R_7 = Time limit relays
R_3 = Polarized relay
R_5 = No-voltage relay
R_6 = Feeder relay
C_1-C_9 = Contacts
M_1, M_2 = Motor-switch operating device
M_3, M_4 = Solenoid-switch operating device

The release mechanism of the main switch is co nected across the bus system, which after the functio ing of the release system is connected to the batte voltage.

HOW THE APPARATUS FUNCTIONS

The switching sequence for cutting in and out, a for the resumption of service after a direct current alternating current disturbance (see circuit diagra for reference numbers) is as follows:

Time switch 11 closes (or hand switch 10 is closed putting the "in" busbar 14 under pressure. After abo three seconds, time-limit relay R-1 connects to this bu bar the motor-operating mechanism of the mai switch M-1.

Transformer switch 1 then closes, closing auxilia contacts C-2 and opening C-1 and C-9.

With the contacts C-2, C-3 and C-4 closed the startin circuit of the motor-mechanism M-2 is closed and th starting switch is brought to the starting (right-hand position.

In this position of the starting switch the time-limi relay R_2 is put under pressure through contacts C_5, an closes its own contacts in a maximum of about 10 seconds. In about thirty seconds the rotary has reache synchronous speed. Should the polarity be incorrect shortly before the machine comes into synchronism, th polarized relay R_3 opens up the excitation circuit of th rotary. Time-limit relay immediately resets itself Thus the time-limit relay R_2 closes its contacts only whe the rotary polarity is correct; *i.e.*, when the polarize relay R_3 remains permanently closed during the tim required by the setting of the time relay (fifty to 10 seconds). Then the contacts of relay R_2 close the "running" contacts of the motor mechanism M_2.

If the transformer circuit breaker is opened due to heavy overload, having been tripped by means of the series overload time-limit release R, the breaker goes back to its no-voltage position, closing C_1 and C_9.

The closing of C_9 connects the storage battery 12 to the "out" bus 15, and automatic breaker 5 is opened by the release magnet. As there is no voltage on the direct current busbars, assuming that no other rotaries are connected to the system, the feeder breaker opens. If other rotaries are involved a reverse-current relay trips the feeder breaker.

The closing of C_1 operates time-limit relay R_1 after about three seconds, and the switching-in process is repeated.

A somewhat different arrangement for the overload time-limit release R is to have it operate in connection with a ratchet relay which, after opening up three times within a short period, will open the transformer switches, leaving them in the open position and locking the circuit out.

When the supply of power to the substation is interrupted, the no-voltage release relay R_5 trips all of the switches and shuts down the entire station until normal line voltage is resumed.

The effect of heavy direct current overload or short-circuit is to open automatic feeder breaker 6 and finally the machine automatic breaker 5 will come out due to overload release. The latter will then be reclosed through contacts C_7 after the operation of relay R_4 in about three seconds. The feeder automatic breaker "switches in" when the contacts of feeder relays R_6 and R_7 close, *i.e.*, when the feeder resistance comes in.

The contacts of time clock 11, which are closed during the daytime, are opened during the evening for a predetermined period. This causes no-voltage relay R_8 to operate, putting pressure on busbar 15. Switches 1, 4, 5 and 6 then come out.

SOME DETAILS OF THE EQUIPMENT

Polarized relay R_3 is a direct-current relay with two current coils having the same number of ampere-turns, electrically separate. It has two contacts which close when the armature is attracted. One coil is connected to the auxiliary battery 12 and the other to the terminals of the rotary. One contact connects the field circuit of the converter while the second connects the pressure coil of the time-limit relay R_2 to the bus 14, or disconnects it. As soon as the starting switch 4 comes in it connects the first coil to the direct-current battery circuit and the second coil to the alternating-current circuit of the rotary field. When the converter approaches synchronism and its "slip" approaches zero the frequency of the alternating current impressed upon the field diminishes and the current in the field changes to direct current when the machine is at synchronism. This may or may not be in the proper direction, but if it is not the resultant field in the relay is zero and the armature drops for about half a second, permitting it to "slip a pole," repeating the operation if necessary, which in general is not.

As previously explained, the cutting in of the feeder switch depends on the feeder resistance, *i.e.*, the resistance in the outgoing line cannot be less than a certain amount. The control of the "switching in" of the feeder resistance is obtained by shunting feeder switch 6 by feeder relay R_6. If the feeder resistance is less than a certain value, a current flows through the current coil of relay R_6 limited by a series resistance 13, which current attracts the armature of the direct-current relay. By the attraction of armature R_8 the coil of relay R_7 is disconnected and its contacts and the starting circuit of contactor M_4 are not closed. As soon as the feeder resistance permits "switching in," the contacts of relay R_6 close and relay R_7 switches in the feeder breaker after a fixed time. This arrangement prevents cutting in the feeder circuit during so-called oscillating short circuits.

Reorganizing After a Strike

Intensive Training Campaign of Trainmen Carried On in Denver Subsequent to Strike Results in Very Prompt Restoration of Service Reliability and Efficiency—Auditorium Meetings Brought to the Attention of Men by Means of Large Posters and Mimeographed Notices Which Were Given Out at the Division Offices

IRREGULARITY of service, inefficiency of trainmen and all manner of trouble are the aftermath faced by a company which undertakes a complete new organization in the transportation department after an unworthy strike. It is often a matter of a year or more before the transportation department will be functioning normally and the trainmen equipped with the proper knowledge of rules, respect for discipline and understanding of what goes to make up good service. The efforts of the Denver (Col.) Tramway to overcome the deficiency of a new transportation organization through an intensive training campaign as directed by Edward A. West, general superintendent, will therefore be of general interest.

On Aug. 1, 1920, the employees of the Denver company went on strike. The company was successful in replacing the strikers with new employees, but the majority of them were inexperienced in street railway work. Because of the dearth of instructors and the urgent need of placing cars in service as rapidly as possible, it was impossible to give these men the usual thorough instruction which is had under normal conditions. The result was the common one under such circumstances, that the company was operating cars with a force of men who were not familiar with many of the details of their work. Conductors were able to collect fares and give the motorman signals, but were unable o make out trip sheets properly and did not understand he transfer system. They were not thoroughly familiar with the city and were therefore unable to direct passengers properly or issue and collect transfers readily. Motormen were able to operate cars as long as nothing went wrong, but in doing so they were abusing the motors and equipment. They did not know how to keep the car on the line in case of trouble and were not familiar with the danger points requiring special operating precaution. Furthermore, trainmen were unable to co-operate with one another because of ignorance as to how this was done or the need for it, and many delays and unreliable service resulted.

It was evident that individual instruction of the entire force would be slow and expensive, and the management therefore decided to give the men intensive instruction in groups, thus economizing the time of the instructors to a great extent and making it possible to reach the entire force in a much shorter length of time.

The subjects to be presented to the trainmen fell into two divisions, requiring different methods of instruction. The first of these divisions included all of those subjects which could be presented to the men in purely lecture form and readily impressed on their minds without resorting to "quizzing." The second division included those subjects of a more highly technical nature which could not be made clear without more or less individual instruction accompanied by examinations and opportunity for the men to ask questions.

All of the subjects in the first division were presented at general meetings of all trainmen in the Tramway Building Auditorium, the speaker presenting his subject only twice on the one day. For the convenience of the men, these meetings were divided into two sections, one in the morning at 10:30 and the other in the evening at 7:30, thus giving practically all men an opportunity to attend.

The subjects of the second division were presented to small groups of trainmen at the several division headquarters and each class was conducted several times at each division. Schedules were so arranged that there were three times of meeting during the day: 10:30 to 11:30 a.m. for night men; 2:30 to 3:30 p.m. for split run men and a small proportion of night and day men, and 7:30 to 8:30 p.m. for day men. Special times were set for a small number of "matinee" men, unable to attend at any of the above periods. Each class, when started, continued to attend at the same time every day until the complete course was covered. Each man was required to take an examination after having completed the entire course of the division meetings.

The arrangement of meetings and subject matter covered is indicated in the following program:

AUDITORIUM MEETINGS

Date	Subject	Speaker
Sept. 16	Day, night and split boards.......	J. L. Adams
	Accident reports..................	S. G. Shaw
Oct. 6 and 11	Transfers.........................	F. W. Werner
Oct. 25.......	The instruction of new men.......	W. L. Abernathy
	The supervisory staff.............	B. V. Polkinghorne
Oct. 29.......	Naming and numbering streets....	F. W. Werner
Nov. 5.......	The treatment of passengers.......	J. L. Adams
Nov. 18......	Organization and discipline.......	E. A. West
Dec. 2.......	The prevention of accidents.......	H. S. Robertson
Dec. 9.......	Relation between employer and employed.......................	E. Stenger
Dec. 16......	Fire runs.........................	Fire Chief Healy
	The traffic ordinance.............	Traffic Sergeant Hunt

DIVISION MEETINGS FOR CONDUCTORS

Subject	Instructor
Trip sheets and turn-ins..........................	G. H. Brinker
Schedule speeds and running times.................	H. J. Kuster
Dispatching.......................................	B. Busch
Transfers...	G. H. Brinker
Drill on rule book................................	W. L. Abernathy
Examination.	

DIVISION MEETINGS FOR MOTORMEN

Schedule speeds and running times.................	H. J. Kuster
Dispatching.......................................	B. Busch
Equipment...	N. R. Love
Handling controller and brake; emergency repairs.......	A. J. Singer
Speed over special trackwork; dangerous crossings, intersections and hills; electric switches..................	A. J. Singer
Drill on Rule Book................................	W. L. Abernathy
Examination.	

Auditorium meetings were brought to the attention of the men by means of large posters, one for each division, and also by means of mimeographed notices which were given out at the division offices. In order to secure maximum attendance, each division superintendent detailed a man to see each trainman on his division and find out which meetings he would attend. This was very helpful in boosting the attendance at the early meetings, but was found to be unnecessary after the men's interest had been aroused.

The division meetings were supplemented by printed material covering the same ground as the meeting. These were handed to the men at the close of each meeting and covered the subject matter for the next meeting. A few days before his meeting, a list was sent to each man of the meetings which he was scheduled to attend, showing the subjects of each meeting, the time, date, place and instructor. At the time of sending these notices out, a roll-call sheet was prepared in quadruplicate, showing the name and number of each man and the meeting with time, place, date and instructor for each class, thus giving a square for each meeting for each man. The original was used by the instructors, the first copy held in case of loss of the original, the second copy used as a record sheet in the office, and the third copy sent to the division superintendent.

A large card was made out for each trainman showing his name, number and division and occupation (motorman or conductor). Assignments were recorded on this card in red. When a man attended a division meeting the date and his grade for the meeting were shown in black, opposite the proper meeting number. Auditorium meetings were shown by stamping the date of the mee ing at the bottom of the card with a crown dater. Th back was used for road instructions given the man.

As the auditorium meetings were not repeated, th misses were not followed up. If a man missed one the division meetings, however, he received an assig ment to another meeting and a notice was sent to him this effect. The new assignment was shown on h record card. A copy of the notice to the man w placed in a tickler file to come out on the day after th assigned meeting. In many cases where a man ha missed a number of meetings, he was notified to repo to the man in charge of schedules and make arrang ments for attending. Every man had at least two o portunities to attend, and a large number had more tha two opportunities. Notice of each miss was sent to th division superintendent interested.

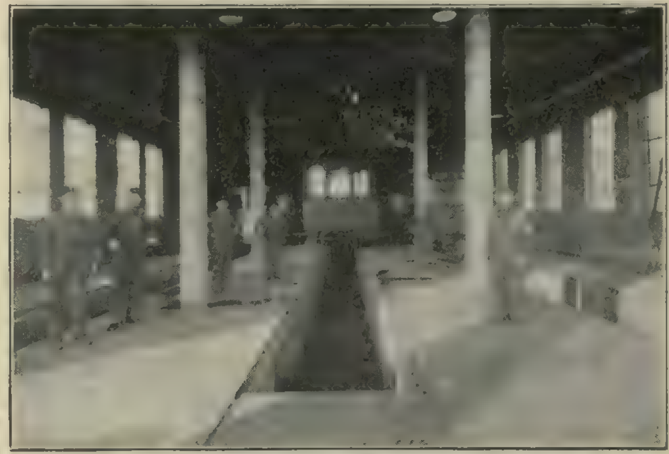
The men were paid for auditorium meetings at th rate of 50 cents per meeting. Division meetings wer paid for at the regular rate of the man, for one hou The reason for this was, when the original plans wer made, the day and night split board was in effect, an it was thought that it would be necessary to relieve eac man during his time on duty, paying him for the entir time as if he were working. Shortly after the classe were started these runs were discontinued and straight nine-hour board was put into effect. The r sult of this was that a large percentage of the me attended the meetings before or after going on duty.

The measure of success gained by the officials i securing attendance at these meetings is given in th following table:

Total number of division meetings..............................	2
Total attendance at division meetings..........................	4 1
Average attendance per meeting.................................	14
Total attendance by men who left company.......................	2
Total attendance by men still with the company.................	3,9
Number of men who finished meetings and examination............	5
Number of men who missed examination...........................	1
Number of men who missed examination and one meeting...........	
Number of men who missed examination and two meetings..........	
Number of men who missed examination and three or more meetings....	1
Average number of meetings attended by each man................	4
Percentage attendance..	76
Total number of auditorium meetings............................	
Total attendance...	3 5
Average attendance at each meeting.............................	5
Total attendance by men who have left company..................	2
Total attendance by men still with company.....................	3,2
Average number of meetings attended by each man................	3
Percentage attendance..	

The final results of this instruction work are impo sible of exact measurement, because other conditio than the instruction program in force at the same tim helped to improve the service. The final measure the results is of course the increase in revenue due t the increased efficiency of the men. Just prior to th time at which the instruction work was started, the tota revenue from city lines was approximately $2,000 pe day less than for the same period in 1919. During th early part of January, 1921, just after the completio of the instruction work, this difference had dropped t approximately $750 per day, or an increase in the ge eral trend of revenue of approximately $1,250.

Part of this improvement is undoubtedly due to th operation of a greater number of cars, but it is als due in great measure to higher operating speeds an greater reliability of service, which are in turn at leas partially attributable to the instruction work. The cos of the instruction campaign was not in excess of $5,50 At a conservative estimate that it resulted in an in crease in revenue of only $200 per day, the cost wa paid for in the course of less than one month's operatio



AT LEFT, FRONT OF NEW CARHOUSE IN MASSILLON, OHIO. AT RIGHT, CONCRETE FLOOR AND OPEN TYPE PITS FACILITATE INSPECTION WORK

New Car House in Massillon Occupied

Northern Ohio Traction & Light Company Moves Into New Brick Carhouse in Massillon, Replacing the Main Street House, Which Was Destroyed by Fire

THE old carhouse of the Northern Ohio Traction & Light Company on Main Street in Massillon was abandoned a short time ago when the occupancy of the new house, built just off the Canton-Massillon Road, was completed. The new carhouse, a brick building with stone trimmings, will care for twenty-two city cars, a snowplow and a work train. It contains a repair shop, with a supply building adjoining, where facilities are provided for making only the lighter car repairs. The main building is 63 ft. wide by 120 ft. long and two stories high.

On the first story open or intercommunicating type pits extending practically the full length of the building facilitate inspection, repairing and cleaning of cars. The tracks over these pits are supported on steel columns incased in concrete. The upper floor, supported by center columns of the same type, contains the dispatcher's office, a trainmen's club-room, separate lockers for the mechanics and trainmen and complete shower baths. The clubroom, containing comfortable chairs, pool tables, books and magazines, is an exceptionally attractive place.

The floors of the building are concrete. It is heated with a vapor heating system.

The carhouse which was damaged by fire some years ago will soon be completely wrecked. The property faces a frontage of 60 ft., with a depth of 420 ft. The new location was selected in order to release for sale this more valuable city property.

There are about 200 ft. of switches in and around the carhouse. As the demands for more trackage increase additions will be made to the yard in the rear of the building. One of the company's substations, itself an attractive building, is located on the same property only a short distance from the carhouse.

Work of F. A. E. S. Is Progressing

A RECENT statement by the executive secretary of the Federated American Engineering Societies, L. W. Wallace, says that permanent headquarters have been established at 719 Fifteenth Street, N. W., Washington, D. C., where there will be a conference room for those engineers who may desire to use the headquarters as a meeting place. Mr. Wallace will be permanently located at this office in the near future. The statement also mentioned recent activity in a number of states regarding the licensing of engineers. While the F. A. E. S. has not initiated any such legislation nor urged its passage, it has taken the position that it desires to be instrumental in securing the passage of bills that will

AT LEFT, A CORNER OF THE DISPATCHER'S OFFICE ON THE SECOND FLOOR. AT RIGHT, TRAINMEN'S CLUBROOM ON THE SECOND FLOOR, MASSILLON CARHOUSE not be detrimental to public interests and to the engineering profession. The field work of the committee on elimination of waste in industry, to which reference has already been made in this paper, will be completed by April 15, and it is expected that the final report will be published some time in June.

The next meeting of the executive board of the Federated American Engineering Societies is to be held in Philadelphia on April 16. The dinner in the evening will be addressed by President Hoover, and it is expected there will be a large attendance of engineers.

New Apprenticeship System of French Railroad

The Paris-Orleans System, Which Will Soon Have an Extensive Electrified Mileage, Has in Use a Comprehensive Plan for Training Mechanics

IN RECENT issues of the *Revue Générale des Chemins de Fer* and the *Génie Civil* some interesting detail is given of the apprenticeship system which is in use by the Paris-Orleans Railway. While this is a steam road, the principles which it has developed have wide application.

The courses of instruction are designed to give apprentices both practical and theoretical training. The students are admitted between the ages of fourteen and seventeen years on the basis of a simple examination, including medical inspection. On admission, apprentices sign a contract which is countersigned by the parents, under which they agree to remain until their military service begins. The breaking of the contract involves forfeiture of the right to a cash reward on completion of the course.

Each year about 400 students are admitted, and they remain to the end to a very satisfactory extent.

The fundamental principles followed in the course are these: (1) The apprentice is developed in the shop, where his work is followed as in a school. (2) He is paid enough to hold him, and he is given sufficient practical work partially to offset his wages and at the same time to interest him. (3) His theoretical instruction, for which about six hours per week are reserved, consists principally of showing why and how the work must be done in a particular way. It comprises courses in French, arithmetic, geometry, physics, mechanics, drawing and technology.

APPRENTICES ARE PLACED IN SPECIAL SHOPS

The apprentice is not placed alone in the midst of regular workmen, but is given special equipment in a separate but real shop. He learns his trade through productive work; making, in the Orleans shop, complete locomotive repairs, for example. Experience shows that the apprentices can become as skillful in this way as if they had been retained in the regular shops.

Unless it is absolutely impossible to do so, the apprentices are grouped in the shop under the surveillance of an instructor, who can effectively direct ten to twelve young men. As far as possible the same instructor gives the practical and theoretical instruction.

The railway gives two general varieties of instruction, that at the depot shops and that at the main shops. The first is designed principally to produce workmen capable of becoming traveling locomotive inspectors and locomotive repair foremen, while the other is to train specialists in the various branches of shop work.

In the courses one-half a day is devoted to theoretic work (six hours per week) and instructive shop exe cises (eighteen hours per week), the remainder of th day being spent in routine work. In the first year th young men are occupied at the bench-vise, on machin tools, at the forge and in the boiler shop. In the secon year they are grouped in special sections supervised b selected workmen, to whom they serve as assistants. I the third year they work under the direction of instru tors but without special workmen.

The foundry and forge apprentices pass a year in on or the other of two special schools, where they follow practical course and cover fundamentals of descripti geometry, tracing of drawings, manual work of th foundry on one hand, or one on theoretical rules the art of modern forging, rules of welding and actu forge work for the other.

The theoretical instruction in the general cours covers three years, although the program is for tw years only, the second year being taken up with revie of the first-year courses.

A supervisor has oversight of the apprentice throughout courses, and competition is fostered by th giving of prizes for excellence in passing examination Graduates from the courses receive diplomas an leather-bound records of the results of their exam inations.

The young men are paid at the start from 1¼ t 1¾ francs per day, according to age, and the compens tion is increased gradually until they reach as much or even more than the regular workmen are paid, their skill and capacity increase.

THE "SECOND DEGREE" COURSE

Young men who in their first year are deemed to b capable of profiting by a higher type of instruction tha that given the apprentices are admitted to a three-yea complementary course. About one-thirtieth of the ne men, or 7 to 8 per cent of the total number of apprentice are admitted to this course each year. This course i covered by a special contract. It covers more advance principles of mathematics, the elements of mechanic and physics sufficient for the understanding of th operation of the machines and the purposes underlyin shop operation, a course in steam machinery and in th repair of the complete equipment, and is topped off b a course in industrial design, some fundamentals of ele tricity, chemistry and political economy. These course are conducted by correspondence with experts at th company headquarters at Orleans. An examination i held each month.

The "second degree" apprentices are counted upon t assure a supply of recruits for positions as inspector foremen, underdepot chiefs, etc.

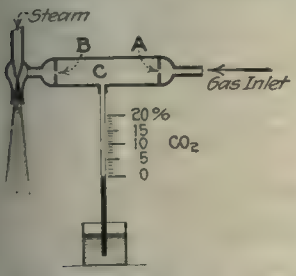
As to the financial results of the apprentice system these are difficult to demonstrate. Apprentices receiv annually a total of about 3,500,000 francs, and th general expense is about 100,000 francs. In addition machines which are repaired by apprentices are out o commission somewhat longer than when they are pre pared in the regular way. The first year the apprentice undoubtedly cost more than they return, but the revers is true during the second and third years. On th whole the 1,200 apprentices appear approximately t produce enough to compensate for the cost of operatin the plan. In addition there is the improvement i recruiting facilities and in the development of bette characteristics in the personnel.

Improved CO_2 Recording Equipment

Added and Improved Features Make CO_2 Recorder More Valuable for Preventing Inefficient Boiler Operation—Remarkably Quick Action, Greater Accessibility and Simplicity of Parts Among Advantages

THE Uehling Instrument Company has introduced a new model CO_2 recording equipment, known as style "U," which embodies important improvements over the superseded model. Chief among its advantages are remarkably quick action, greater accessibility and simplicity of parts and the economy of combining in one machine means for determining CO_2 simultaneously from any number of boilers up to six.

A single-unit Uehling CO_2 equipment for one boiler consists of three principal parts, namely, a CO_2 meter proper, a recorder and an auxiliary boiler front indicator. The function of the meter, which is placed wherever most convenient, is to actuate the boiler front indicator and the recorder in the engineer's office.



THE CHAMBER OF THE CO_2 METER, ILLUSTRATING THE PRINCIPLE INVOLVED IN ITS OPERATION

The flue gas is analyzed—that is, the CO_2 is extracted—in the meter. The principle involved in the operation of this machine depends upon the change in pressure caused by a change in volume in a stream of gas flowing through two apertures. Referring to the diagram, gas is drawn continuously by the action of an aspirator through aperture *A* into the chamber *C* and out through aperture *B*. A reduction of the gas volume between the two apertures caused by the absorption of the CO_2 content causes a change of pressure or tension in chamber *C*, which is transmitted to the recorder and indicator calibrated in per cent CO_2.

The CO_2 meter consists essentially of a cylindrical regulator on which is mounted the analyzing mechanism. This regulator maintains constant the suction created by the aspirator, thereby eliminating all changes in pressure between the two apertures except those caused by absorption within the chamber. It is the latter changes in pressure which the indicator and recorder register.

Suction in the chamber actuates the recorder and indicator continuously and almost instantaneously. The only appreciable lag was formerly in the travel of the gas from the boiler to the instrument. In the new model the gas travel is hastened by utilizing the main aspirator's exhaust in an auxiliary aspirator to draw the gas from the boiler up to the absorption chamber, while the main aspirator simply draws the gas sample through the absorption chamber. The preliminary filter, which removes soot and dirt from the sample before it reaches the intermediate and final filters on the machine, has been redesigned so that the filter chamber can be conveniently cleaned without interrupting the operation of the apparatus. This method of flue gas analysis employs no chemicals, but substitutes for them a convenient dry absorbent carton, readily removed and replaced.

Multiple equipments combine in a single outfit means for measuring the percentage of CO_2 from one up to six boilers independently. This apparatus is designed on the unit plan and may be added to from time to time. For instance, a plant having initially an equipment of less than six units can easily have attached additional units, until the total is six, as new boilers are installed.

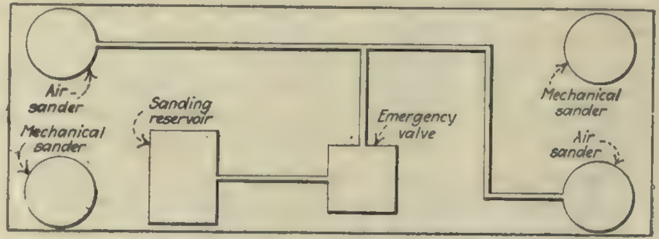
Mechanical Sanders for Safety Cars

Two Air Sanders Used on Safety Cars of Trenton & Mercer County Traction Company Being Replaced with Mechanical Sanders in Interest of Safety and Economy

BY HERBERT E. KROUSE
Master Mechanic Trenton & Mercer County Traction Company, Trenton, N. J.

ON THE sixty Birney safety cars which the Trenton & Mercer County Traction Company is operating the sanding equipment originally consisted of four sand hoppers with air sanders, all of which were in operation whenever an emergency application of the brakes took place. This caused an exceptionally large amount of sand to be used, which the company's officials felt could be somewhat reduced. Results of trials made in Trenton have shown that, while the air sanding feature which is incorporated in the M-28 brake valve has many good points, still a mechanical sander which will operate with a slight continuous foot pressure seems preferable.

The excessive amount of sand used with air-operated sanders, the labor necessary for drying the sand and filling the sand boxes, the added duty put on the air compressor, the lack of sand where the air fails and the rather high maintenance of the brake valve which is used to operate the air sander combined to make it desirable to change this part of the equipment. The accompanying diagram shows the arrangement which is now being used. One air sander on each end of the car has been removed and foot-operated mechanical sanders, manufactured by the Nichols-Lintern Company, have been substituted. In regular service this would give but one sand box delivering sand to the rail instead of two.



ARRANGEMENT OF SANDING EQUIPMENT FOR SAFETY CARS

The two remaining air sanders are disconnected from the brake valve, but still retain their connection with the emergency valve. This assures the delivery of sand to the rail during an emergency application from either the brake valve or the controller handle, and insures that but two sanders are working instead of four. The hinged air lever is no longer a necessity and this change should materially increase the life of the lever and reduce the maintenance cost.

From results so far obtained, we believe that by carrying out this change we shall be able to effect a very large saving over our present cost for maintaining the sanding equipment on our safety cars and in all other items bearing a relation to this one there will be a corresponding saving.

Boiler Inspectors Meet in Detroit

THE first annual meeting of the National Board of Boiler and Pressure Vessel Inspectors brought together at the Hotel Statler in Detroit recently a group of about sixty men, including members of the board itself, members of the boiler code committee of the American Society of Mechanical Engineers and other interested persons.

The first day was devoted to addresses. Dr. D. S. Jacobus, acting chairman of the boiler code committee, told of the development of the code, emphasizing the fact that no action had been taken without consideration of the interests of all involved in the questions under discussion. Charles E. Gordon, chairman of the American Uniform Boiler Law Society, told how the first boiler code committee came to be appointed by Colonel E. B. Meier, then president of the A. S. M. E.; how the society had reached the limit of its functions in the formulation and interpretation of the code; how the Uniform Boiler Law Society had been organized to promulgate the code, and how the National Board of Boiler and Pressure Vessel Inspectors had been organized at the instigation of the American Uniform Boiler Law Society.

Some of the other speakers were E. R. Fish, vice-president Heine Safety Boiler Company; F. R. Low, editor of *Power*, and J. G. McCabe, commissioner of the city of Detroit and chief inspector of boilers for the State of Michigan.

On the second day the members of the board took part in the deliberations of the boiler code committee, the meeting of which was held at Detroit in order to give the committee the advantage of conference with men from all over the country who are enforcing the code. Joseph F. Scott, inspector from New Jersey, is to continue as chairman of the National Board, and C. O. Myers of Ohio as secretary-treasurer. The objects of the Board of Boiler and Pressure Vessel Inspectors as stated in the constitution adopted are as follows: To promote uniform boiler laws; to secure uniform approval of specific designs of boilers and other pressure vessels, as well as appurtenances and devices used in connection with their safe operation; to promote one uniform code of rules, one standard stamp to be placed upon all boilers constructed in accordance with the requirements of that code, and one standard of qualification and examination for inspectors who are to enforce the requirements of said code, and to compile official statistics.

FOUNDATION READY FOR THE LAYING OF THE TRACKS

Track Construction During Severe Weather

ACCOMPANYING photographs show different stages of the work of double tracking a line in Fort Wayne, Ind., by the Indiana Service Corporation. This work was done on Clinton Street, between Main and Lewis Streets, a distance of five blocks. The work was completed in a little less than a month's time at a cost of approximately $50,000. During the construction the temperature of the weather was below freezing for a considerable part of the time and in one of the accompanying illustrations the substructure may be seen covered with manure to keep the new construction from freezing.

Previous to the double tracking of this line there was a single track on this street, but the congestion of traffic on Calhoun Street, which is one block west of Clinton Street, and is the main traffic street of the city, was so great that some change was imperative. It was accordingly decided to double track the line through Clinton Street and run the cars both ways on this street instead of into the city as was done previously. The city authorities insisted that the Indiana Service Corporation complete the work within one month, and the work was done in this time by working both day and night shifts.

AT LEFT, TIES IN PLACE AND TRACK CONSTRUCTION STARTED. SUB-BASE COVERED WITH MANURE TO PREVENT FREEZING. AT RIGHT, TRACKS IN PLACE AND CONCRETE BEING POURED

Letters to the Editors

Accident Reduction Versus Excessive Concentration Upon Fare Collection

NEW YORK CITY, March 25, 1921.

o the Editors:

A recent analysis of damage and injury claims and uits against street railways showed that the primary ause of one class of accidents is that more attention s devoted by the conductor to the collection of fares han to the safety, comfort and convenience of his pas- engers.

It is all very well to endeavor to impress the car peratives with the importance of "safety first," but he relation of fare collection to this must not be overooked. While the now almost universally used "closed tep and door," especially of the type used in the one-an car, have, if properly used, a great tendency to essen "step accidents," they introduce danger of accient if carelessly operated. This is due to the fact hat there have been laid on the car operatives, espeially on the conductors or fare-takers, other duties hich engage their attention to the exclusion of care hich should be exercised for the safety, comfort and onvenience of the passengers.

The "prompt and accurate" collection of fares is made fetich by many street railway companies, although odern fare-collection practice renders it no longer ecessary for the conductor to concentrate his whole ttention on that one point.

On one property investigated, not 10 per cent of the onductors paid more than perfunctory attention to the pening and closing of the steps and door. A complete nalysis of the situation on this road and on others lainly proved that the trifling saving in fares effected y the strict attention required of the conductor in ompletely collecting them was but a small fraction of he resulting cost of the accidents, the unfortunate ffect of the "near accidents" and the accompanying rritating incidents. While "safety first" was well ropagated among the carmen, there was lacking the ncentive that existed with reference to the collection f fares. The fare-taker was held personally accountble for proved failure to collect the full amount and umber of fares and consequently manifested a strong nterest in this portion of his duties.

This matter was brought strongly to the attention f the writer many years ago when he was operating street railway on which there was not only the usual ush traffic at morning, noon and night, but which had, uring the summer season, tremendous rush traffic durng whole days due to excursionists and other pleasure eekers. This was complicated, at that time, by the se of open cars and by the fact that the conductor ersonally collected fares by passing through the car r on the side-board of the open cars. After analysis f the situation the stress on the carmen regarding fare ollection was reduced and more emphasis was laid upon ccident prevention, with a full explanation to the caren as to the reasons therefor. The results were carelly watched and, as far as possible, tabulated. The rst results were not especially encouraging as regards fare collection, but the results as to the lessening of accidents were so good that the proof of the efficiency of the change was noticeable. After the elimination of the carmen who dishonestly took advantage of the concession, the number of accidents was permanently reduced more than two-thirds.

This matter is certainly worth the consideration of many street railway managers, as it is found that few of them have properly considered this aspect of the case. "MANAGER."

"Present Value" in the Galveston Case

CHICAGO, April 1, 1921.

To the Editors:

In your issue of March 19, page 571, there is a summary of a court decision entitled "Present Value Theory Rejected." The title is misleading, for the court sustained the present value theory, and actually added 33⅓ per cent to the original cost to get the prospective reproduction cost, from which accrued depreciation was deducted. H. P. GILLETTE.

[EDITOR'S NOTE.—The thought back of the caption written was that the special master's proposed plan of recognizing present value in the Galveston case was rejected. Mr. Gillette is correct, however, in his statement that the court did not reject, but rather followed, the present value theory as the correct basis, as described in the article, although the court took a somewhat novel method of arriving at the figure to use.]

Car Development in Boston

IN THE March, 1921, issue of *Stone & Webster Journal* appears an interesting account of the development of the urban transportation system in and around Boston, Mass., from the time that coaches and omnibuses were first operated. It seems that the first omnibus in Boston, the "Governor Brooks," started running in 1833, over a route from the Winnisimmet Ferry at the foot of Hanover Street to Roxbury. The fare was 12½ cents and it took an hour and a quarter to make the trip. The bus was drawn by four horses and had seats for eighteen passengers outside and six inside, making a total of twenty-four.

The first horse railway in Massachusetts is said to have been from Harvard College, Cambridge, to Union Square, Somerville, about 1½ miles. The equipment was a dilapidated steam railroad coach, to which a pair of horses was hitched. There is a wide disagreement as to the date of the brief career of this horse railway. In 1852 the first charter was granted to a horse railroad. This was to what was known at that time as the Dorchester & Roxbury Railroad. The first horse-drawn street car was run over Boston streets on March 26, 1856. Electric cars were first operated on Feb. 16, 1889.

The original horse cars were 16 ft. long, with a seating capacity of twenty. The first cars with electric equipment seated thirty-four passengers and cost $3,500. In 1905 the semi-convertible car was introduced. This was 48 ft. 2.5 in. over all and had seats for fifty-two passengers and cost from $10,000 to $12,000. In 1917 the center-entrance, 6,000 type car was first put on the streets. This car is 48 ft. 2.5 in. over all, seats fifty-eight and cost $15,000. The Cambridge subway cars are 69 ft. 2.5 in. over all, seat seventy-two and cost $24,000 each.

Association News

Audit Nearing Completion

PRESIDENT GADSDEN was in New York last week. In speaking of the association affairs, he said that the financial audit, which is being made under the direction of M. R. Boylan, Public Service Railway, is nearing completion. The check-up indicates that the loss due to misappropriation of funds will exceed the amount originally given out. At the present time this is estimated at from $60,000 to $70,000.

No definite action has been taken on the selection of a permanent secretary. One suggestion, made by several members of the association representing large interests, is that the position of secretary be not filled immediately. Several names for the position of secretary have been mentioned.

The next meeting of the executive committee will be held on April 15.

Convention Committees

TWO additional committees, one on convention location and one on exhibits, have recently been appointed to assist in perfecting plans for the 1921 convention.

The personnel of the committee on location consists of J. G. Barry, General Electric Company, New York, chairman; D. B. Dean, Kuhlman Car Company, Cleveland, Ohio; F. C. J. Dell, National Railway Appliance Company, New York; H. B. Flowers, United Railways & Electric Company, Baltimore, Md.; F. H. Gale, General Electric Company, Schenectady, N. Y.; B. A. Hegeman, Jr., National Railway Appliance Company, New York; C. L. Henry, Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.; J. B. Kilburn, Hale & Kilburn, New York; W. H. Sawyer, East St. Louis & Suburban Railway, East St. Louis, Ill.; J. N. Shannahan, Newport News & Hampton Railway Gas & Electric Company, Hampton, Va.; H. D. Shute, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., and J. J. Stanley, Cleveland Railway, Cleveland, Ohio.

The committee on exhibits is made up as follows: J. C. McQuiston, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., chairman; F. C. J. Dell, National Railway Appliance Co., New York; F. H. Gale, General Electric Company, Schenectady, N. Y.; S. D. Hutchins, Westinghouse Traction Brake Company, Columbus, Ohio; E. B. Meissner, St. Louis Car Company; W. J. Pine, Railway Utility Company, Chicago, Ill.; E. C. Price, Indianapolis Switch & Frog Company, Cleveland, Ohio; A. M. Robinson, J. G. Brill Company, Philadelphia, Pa.; W. L. Schaeffer, National Tube Company, Pittsburgh, Pa., and L. W. Shugg, General Electric Company, Schenectady, N. Y.

The exhibit committee has sent to manufacturer members through acting Secretary Welsh four questions concerning the holding of an exhibit at the 1921 convention. It is hoped to determine in advance if possible the attitude of the manufacturers on this matter due to present depressed business conditions and the unsatisfactory proposition offered by the pier representatives at Atlantic City. The questions are based on a charge for exhibit space of 60 cents per square foot, the same as last year. Each member is requested to say if he favors holding an exhibit at Atlantic City, whether or not he will exhibit, and approximately how much space he will use. Answers are requested by April 12 due to the fact that the matter must be definitely decided at the coming executive committee meeting, to be held on April 15.

Delegates to Annual Meeting of Chamber of Commerce

ACTING SECRETARY J. W. WELSH of the American Association has just announced the names of the national councillor and alternate and the delegates and alternates for the annual convention of the Chamber of Commerce of the United States, to be held in Washington, D. C., April 27 to 29. The list follows:

National councillor, Lucius S. Storrs, president the Connecticut Company, New Haven, Conn.; alternate, J. H. Hanna, vice-president Capital Traction Company, Washington, D. C. Delegates, J. P. Barnes, president Louisville (Ky.) Railway; W. A. Draper, vice-president Cincinnati (Ohio) Traction Company; P. H. Gadsden, vice-president United Gas Improvement Company, Philadelphia, Pa.; John H. Pardee, president J. G. White Management Corporation, New York, N. Y.; W. H. Sawyer, vice-president E. W. Clark & Company Management Corporation, Columbus, Ohio; Thomas S. Wheelwright, president Virginia Railway & Power Company, Richmond, Va. Alternate delegates, H. W. Blake, editor ELECTRIC RAILWAY JOURNAL, New York, N. Y.; F. R. Coates, president Toledo Railways & Light Company, Toledo, Ohio; D. B. Dean, manager Kuhlman plant the J. G. Brill Company, Cleveland, Ohio; M. B. Lambert, manager railway department, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.; Charles C. Peirce, manager railway department, General Electric Company, Boston, Mass.

Way Committee Meets

A MEETING of the Engineering Association committee on way matters was held at association headquarters on April 6. All day and evening was spent in technical discussion of standardization of special trackwork, joint welding and allied topics. The results of a large amount of detail work by sub-committees were presented and it was evident that real progress has been made in the difficult work of standardizing frogs, crossovers, turnouts, etc. Some recommendations as to standards were adopted and a tentative program was laid out for the next meeting, to be held May 18, with provision for necessary sub-committee meetings in the meantime. The committeemen present were: R. C. Cram, Brooklyn Rapid Transit Company, chairman; H. A. Abell, New York State Railways, Rochester; Victor Angerer, Wm. Wharton, Jr., & Company, Easton, Pa.; S. Clay Baker, East St. Louis & Suburban Railway, East St. Louis, Ill.; W. R. Dunham, Jr., the Connecticut Company, New Haven; E. B. Entwisle, the Lorain Steel Company, Johnstown, Pa.; Howard H. George, Public Service Railway, Newark, N. J.; E. M. T. Ryder, Third Avenue Railway, New York, N. Y., and James Budd and F. A. Weymouth, representing C. A. Alden, Bethlehem Steel Company, Steelton, Pa., who was kept away by illness. A telegram of sympathy was sent Mr. Alden by the committee. S. W. Dannatt, Rail Welding & Bonding Company, New York, N. Y., was also present by invitation.

Co-operation and Responsibility

THE following letter was written by H. M. Atkinson, chairman of the board of directors of the Georgia Railway & Power Company, Atlanta, Georgia, to W. D. Mahon, president of the Amalgamated Association of Street and Electric Railway Employees of America, subsequent to the appearance of Mr. Mahon's article in the Feb. 12 issue of the ELECTRIC RAILWAY JOURNAL.

Mr. Mahon has written to Mr. Atkinson that he will answer his letter in the near future. Meanwhile this original letter is printed in the ELECTRIC RAILWAY JOURNAL with the consent of Mr. Atkinson and Mr. Mahon. The letter follows:

GEORGIA RAILWAY & POWER COMPANY
OFFICE OF THE CHAIRMAN

ATLANTA, Feb. 24, 1921.

MY DEAR MR. MAHON: Your article on the street railway problem which appears in the Feb. 12 issue of the ELECTRIC RAILWAY JOURNAL is very interesting. Your statement appeals to me because I am especially interested in the problem, and also because you state the points clearly and simply. In the main I agree with everything you say.

There is one phase of the service-at-cost plan that you do not deal with. This particular phase is the one that has given me most trouble in trying to bring myself to accept the plan. To put it briefly, the question I wish to ask is, how are you going to prevent expenditures, and therefore rates, from spiraling upward in "vicious circles"? It seems to me that this problem must be solved in each case where the plan is adopted. I have general ideas of my own how this could be accomplished, but I am very anxious to have your views. Personally, I doubt whether a supervisory commission or commissioner will solve this question satisfactorily.

In some way the incentive to efficiency must be retained. If all hope of gain, or perhaps a better way to put it is reward, from efficiency is removed, capital cannot be obtained, nor will men of proper skill and ability be obtainable. No matter what our beliefs or theories may be, if the incentive of gain or reward is removed business will die.

The problem the Federal Labor Board is struggling with in Chicago at the present moment is, in a nutshell, nothing but what I have tried to state above. The labor organizations tell the roads if they are losing money to go to the Interstate Commerce Commission and get higher rates. But the rates already are all the "traffic will bear." No matter how much we may protest against it, there is no avoiding the economic law that wages as well as rates must and will come down or go up relatively to the decrease or increase in the purchasing power of the dollar. The value of the services of every individual worker, including you and me, is subject to that law.

Why isn't the present Cummins-Esch law in its general application a service-at-cost plan?

Referring to your idea of co-operation between the public (consumers), the owners and the operators, I agree with you thoroughly. But it has not been worked out practically, so far as my observation goes. If organized labor can be induced to assume completely its just share of responsibility for production to the extent of guaranteeing it with responsibility, I imagine that nearly all the opposition to the "closed shop" on the part of employers will disappear. It is my opinion that the weakness of organized labor is that it does not come out frankly and accept this responsibility. It cannot be avoided in the end, and the fact that it does not accept such responsibility is the source of nearly all the trouble. What I mean is that if organized labor seeks partnership it must assume the responsibility of a partner. It must accept the unavoidable fact that the only source for the payment of wages is production.

I have been hoping for a long time to see you again. I would like to discuss this subject and others with you.

H. M. ATKINSON,
Chairman of the Board.

Controversies Over Car Insurance Eliminated

A NEW form of insurance policy covering rolling stock has this year been negotiated with the insurance companies by T. A. Ferneding, vice-president and general manager Dayton, Springfield & Xenia Railway, Dayton, Ohio. The usual form of policy covers all cars at 100 per cent of their combined value and is known as a blanket policy. In case of loss by fire, when the company has a policy of this kind, there are two positions the insurance companies may take which tend to defer settlement.

If the insurance company establishes on investigation that the insurance carried on all cars was less than 100 per cent of their value, the railway company becomes a "co-insurer" to the extent of the percentage of total value not covered. On the other hand, if the insurance company takes the position that the cars are overinsured, and therefore refuses to pay the full loss on that basis, then the railway company is in the position of having paid premiums on the excess insurance to no avail.

In the new form of policy each car is listed by number with a stipulated value determined by two people and agreed upon in advance by the railway company and the insurance company. This list of car numbers and corresponding values is attached to the policy and made a part thereof. If the value of a particular car is established at $15,000 it is insured at $15,000, and in case of loss the railway company simply makes claim for the loss of certain cars listed by number, and their value is a fixed amount upon which there can be no controversy. The values placed upon the cars are adjusted each year to provide for changing market conditions and deterioration of equipment. Mr. Ferneding thinks that this arrangement will eliminate a lot of unpleasant negotiation and properly insure the railway company against loss or excess premiums.

Congress has increased the annual appropriation for the United States Forest Products Laboratory, located at Madison, Wis., by the sum of $100,000. This will enable the laboratory to extend its researches in the field of wood preservation, etc., many of which are of great value to the electric railway industry. Carlile P. Winslow, director of the laboratory, has issued an expression of appreciation of the active indorsement of the laboratory by its many friends.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Toledo Problems Pressing

Rerouting, Wages and Power All Claim Attention Under Service-at-Cost —Will Check Costs

Toledo has a great deal to think about as a result of the submission of a rerouting plan, suggested wage reductions by the Community Traction Company, and negotiations looking toward the establishment of a proper power rate for the traction company.

Four Plans for Rerouting

At a meeting of the board of control Commissioner Wilfred E. Cann presented four suggestions for rerouting which were approved and handed over to the Council for action. One of these would result in the rescinding of a 12-mile speed law and permit speeding up of all cars so as to obtain a 9-mile an hour average rather than 8 as now.

The wage contracts of platform employees and electrical workers expired at midnight on March 31 and at that time no agreement had been reached. It was agreed, however, to maintain the status quo until April 8.

The present wage scale for platform men is 60 cents for those who have been with the company for six months, 56 cents for those in employ three months, and 54 cents for those beginning. The scale suggested by the company and turned down by the men provided for a cut of 2 cents an hour for the old employees and rates of 54 and 50 cents an hour for the other classes. The cost of living in Toledo was shown to have dropped 15 per cent since the 1920 contract was drawn.

It has developed that the Community Traction Company took up as an obligation with the railway property approximately $50,000 of last year's taxes on the railway. Commissioner Cann and the board are attempting to spread this amount over a long period so that operating costs will not be loaded too heavily the first few months. The company also took to itself paving obligations of $185,000 and it is the feeling of the board that this item should be placed in capital account in some way.

Power Engineers Confer

The power matter was taken up at a conference attended by Law Director Martin; Commissioner Cann; B. V. Phillips, consulting engineer, Cleveland; Henry Riggs, valuation engineer, Ann Arbor; David Friday, accountant, Ann Arbor; members of the street railway board, Frank Coates, president of the traction company, and Ferd Derge, assistant general manager of the Toledo Railways & Light Company.

The Acme Power Company plant, a Doherty enterprise, not a public utility, supplies 90 per cent of the traction power. If Henry L. Doherty will give permission David Friday and B. V. Phillips will check the costs right back to the coal pile. Then negotiations for a fair rate will begin with arbitration as the final step in the event of failure to agree.

Taxpayer Attacks Cincinnati Service at Cost

Forfeiture by the Cincinnati (Ohio) Traction Company of its fifty-year franchise, granted by the Rogers law in 1896, was demanded by Attorney Albert S. Alcorn in a taxpayer's suit filed in Common Pleas Court on March 29. The Cincinnati Street Railway, from which the Traction Company leases its lines and rights, also is made a defendant. The suit charges that the Traction Company has violated its franchise in that more than 5 cents is charged for a ride in violation of the provisions of the Rogers law. Attorney Alcorn, explaining this provision, said that he believed the revision ordinance, known as the service-at-cost plan, was unconstitutional. The Rogers law, he explained, provides for a decrease in fare only.

The plea asserts also that the companies have decreased the percentage tax on gross earnings which they were required by the terms of the fifty-year franchise to pay to the city. Refusal to pay car license fees required by the Rogers law also is charged in the suit.

Other charges in the suit against the companies are that they have sold steel rails and other commodities to individuals and corporations, thus defrauding the city out of $400,000.

Attorney Alcorn says that on Feb. 17 he requested City Solicitor Saul Zielonka to file suit. This he supplemented with additional reasons to the solicitor on Feb. 21 and March 7, but Mr. Zielonka has refused to bring action so he filed it himself as a taxpayer. Mr. Alcorn declares that the Cincinnati Traction Company is an Ohio corporation organized "for the purpose of furnishing a corporate name in which to lease from the Cincinnati Street Railway its lines of street railway in the City of Cincinnati, under what is known as the Rogers fifty-year franchise law."

Elsewhere in this issue reference is made to the resignation of C. P. Taft as first vice-president and director of the Ohio Traction Company and to the withdrawal of W. C. Culkins as City Street Railway Director to become executive secretary of Cincinnati Chamber of Commerce.

Another Solution Offered

Representatives of City of New Orleans Advance New Plan with $35,000,000 Valuation Figure

A rift has finally been made in the clouds of uncertainty that have hovered over the prospective settlement of the troubles of the New Orleans Railway & Light Company. At a meeting on March 30 of the Mayor, the Commissioners of the Commission Council and the members of the citizens' advisory committee a tentative plan was submitted by the representatives of the city looking to possible solution of existing entanglements.

Under the plan it is proposed that:

1. A valuation of $35,000,000 be placed on the entire property of the New Orleans Railway & Light Company, divided as follows:

New Orleans railway proper....	$20,000,000
Electric light and power plant..	8,000,000
Gas plant	7,000,000
Total	$35,000,000

Upon this valuation it is estimated by the Mayor and the Commission Council that the returns must be $2,150,000, allowing 7 per cent upon $5,000,000 of new money which it is estimated will be needed for rehabilitation.

Reduced Fares Suggested

2. The rate of fare after April 21, 1921, when the 8-cent fare expires by limitation, must not exceed 7½ cents; with reductions every six months thereafter of one-half cent until a "normal" level is reached.

3. The rates for gas and electricity must be cut proportionately and recommendations made for the acquisition of the gas plant at the valuation of $7,000,000.

4. Allowances must be made for proper reserves for replacements.

5. No distribution of undivided profits of the company shall be permitted without approval of the Commission Council.

6. No future issues of securities shall be permitted without the consent and approval of the Commission Council.

In anticipation of the probable purchase of the gas plant an ordinance is now being prepared by the City Attorney for submission to the Constitutional Convention, giving the city permission to issue bonds against any public utility.

Reports dissenting from the conclusions reached by the general committee have been filed with Judge Foster, of the federal court, by Walter B. Spencer, Leigh Carroll and Robley D. Stearns.

More Wage Cuts Proposed

Employees of Rochester, Syracuse and Utica Lines Solicited to Accept 1918 Rates

Proposals have been made by the New York State Railways for wage cuts of as much as 25 per cent on May 1 among trainmen employed on the lines of the company in Rochester, Syracuse, Utica and other cities. The proposed cuts are: City lines, from 60 cents an hour to 45; interurban, 62 to 47; third rail, 65½ to 50½.

In his letter to the men through Chairman Noon, President Hamilton of the New York State Railways says:

> After a most careful consideration of all interests involved the public, the employees and the company, and inasmuch as all authentic statistics show that the cost of living today has reached a point below where it was in July, 1919, and the general tendency indicates a further reduction in the price of clothing, foodstuffs and other commodities which go to make up living expenses, we feel that the wages as fixed by the National War Labor Board for motormen and conductors under date of July 31, 1918, would be fair to all parties interested under this contract.
>
> The working conditions under the present contract are an accumulation of years and have become so cumbersome and burdensome that it is impossible for the company working under them to furnish the best service to the public, and for that reason it has decided upon the changes set forth in the revised agreement submitted herewith.
>
> This company has increased the rate of wages to its employees 126.41 per cent over that paid at the beginning of the world war, while the increase in gross revenue has been only 37.65 per cent. On account of this condition the company was obliged to forego the payment of a return to its stockholders, never having previously paid a fair return to the people whose money is invested in this property.
>
> This condition cannot continue, not alone from the fact of the non-payment of dividends, but that the credit of the company must be restored and maintained at any cost if it is to meet the capital expenditures necessary to perform its first and principal duty, viz: Service to the communities through which it operates.
>
> I feel that in view of the importance of this subject a meeting of the representatives of the employees and the officials of the company should be held at the earliest possible moment, and would suggest April 4, 1921, in my office at Rochester, if convenient to the officers of the Amalgamated Association, at which time the whole matter can be discussed.
>
> I want the employees to feel that the company will exercise the same spirit of fairness that has been displayed in the past, and after a full and frank discussion of the whole matter we believe an adjustment can be reached which will be fair to the employees, to the public and to the company.

President Hamilton's letter does not specify the working conditions which have become "so burdensome and cumbersome."

These are the roads whose employees are asked to go back to where they were prior to May 1 of last year and accept practically the wage scales put in effect by decision of the war labor board in 1918:

New York State Railways, Syracuse, Rochester, Utica and connecting lines owned by the same company.

Rochester & Syracuse Railroad, connecting the two cities and serving communities between.

Auburn & Syracuse Electric Railroad, connecting the two cities and also covering the local lines in the city of Auburn and to Owasco lake.

Empire State Railroad Corporation, connecting Syracuse with Oswego, and including the Oswego city lines, and the Auburn & Northern, an 8-mile route connecting with the Rochester & Syracuse at Port Byron and with the Auburn & Syracuse at Auburn.

The Syracuse Northern (the South Bay road).

Prospects appeared to be bright for the settlement of the wage matter in conference after the first meeting on April 4. Definite findings, however, are not expected to be reached for a week. Meanwhile little information is expected to be available to the public. Mr. Hamilton is quoted to the effect that if an agreement can not be reached in conference then points in dispute will be arbitrated. The matter must of course be submitted to the men for final vote.

Schenectady Company Would Cut Wages

The new wage scale proposed by the Schenectady (N. Y.) Railway makes a reduction of 25 per cent from the present scale of 60 cents an hour. The new rate, which is to go in effect on May 1, is the same as the men were receiving a year ago.

The company was able to grant an increase about a year ago when the Common Council waived franchise rights temporarily allowing the company to petition the Public Service Commission for an increase from 6 to 7 cents in local fares and other increases on interurban lines.

There is an arbitration clause in the present agreement. Under the provisions of the contract the company had to present the draft of the new agreement thirty days before the old agreement expired.

Indiana Line Unable to Make Improvements

The railroad committee of the City Council of Evansville, Ind., has reported to the Council that Frank J. Haas, vice-president and general manager of the Southern Indiana Gas & Electric Light Company, has refused to extend the Howell line as requested by the committee. Mr. Haas said that the proposed extension would cost the company $30,000 or more and that the company could not afford at this time to make the improvement.

The company has also notified the Board of Public Works of Evansville that it will not make street improvements as requested by the board. Mr. Haas contends that the improvement of the portion of the streets between the rails does not benefit the railway and that the property owners along the street should pay for it. Mayor Bosse would "throw the tracks off the street and put in a bus line." The Mayor is said to have announced that he had received a letter from Glenn Van Auken, of the Public Service Commission, in which he advised that the City Council pass an ordinance demanding the company meet certain requirements of service.

Railway Versus Motor Bus

Canadian Commission Hears Experts on Relative Reliability for Use Between Toronto and Hamilton

James E. Richards, manager of the London & Port Stanley Railway, in giving evidence before the Ontario (Sutherland) Hydro-Radial Commission at Toronto the last week in March, as to the practicability of the proposed high-speed line between Hamilton and Toronto, submitted the following figures showing the growth of traffic:

Year	Number of Passengers	Amount of Freight
1917	726,799	$147,826
1918	842,641	143,608
1919	958,587	188,187
1920	1,002,034	210,239

At the time of electrification of the line it was estimated that the business could be done with four motor cars and five trailers; the railway was now using seven motor cars and ten trailers.

Mr. Richards stated that 97½ per cent of the business was competitive and could be handled by the Canadian Pacific, Grand Trunk, Michigan Central, Wabash and Pere Marquette steam roads, and in reply to a question stated that the business came to the electric railway because of service.

The total earnings now were $25,781 per mile, of which $11,017 were passenger receipts.

On the following days, March 30 and 31, Walter Jackson, consulting engineer, Mount Vernon, N. Y., testified. He stated that the cost of motor bus transportation was just about double that of electric cars operated over routes of reasonably dense traffic. For long-haul freight service the cost of common-carrier motor trucking was just about twice as much as many operators imagined. Even in the comparatively dense traffic district of New England there had been many failures. Mr. Jackson submitted figures showing that a 5-ton truck going 80 to 100 miles a day costs to operate about 60 cents per mile, or $60 a day, including the cost of warehouses, business solicitation, etc.

A motor bus company could not possibly carry passengers at the proposed hydro-radial rate of 2½ cents per mile; it was an impossible rate no matter how much business was secured. Besides it could not possibly meet the schedule of a rapid transit line.

On Friday Charles A. Cheval, auditor of the International Railway, operating between Buffalo and Niagara Falls and other points, was a witness. The new 17-mile high-speed line between these cities cost $225,000 a mile, of which $180,000 was for right-of-way and structures, while power equipment and general cost amounted to $45,000 a mile. The new line enabled the company to cut thirty minutes off the time run, reducing it to one hour.

T. H. Stoffel, of the Westinghouse Company, stated that American express companies were doing away with motor trucks in smaller towns and replacing them with horse-drawn trucks.

Reports on Abandoned Lines

Massachusetts Utilities Department Not in Favor of State Ownership—Recommends Local Sudsidy

In reply to a set of questions relating to abandoned electric railway lines propounded to it by the State Legislature, the Massachusetts Department of Public Utilities has submitted a report the most striking feature of which is a firm stand in favor of "home rule" by local communities as regards the financial support or subsidy of weak lines and against a general policy of state ownership or aid, and secondly the abolition of the commutation tax and charges for highway maintenance.

370 MILES ABANDONED

The department considered it impossible to pass a properly considered specific judgment on the first question which asked for a determination as to what lines, whether now in operation or not, are necessary for the public welfare and convenience.

The report begins with a recapitulation of the discontinued lines in the Commonwealth. It shows that a total of seventeen electric railways have abandoned operation of 371.27 miles of track.

Referring to their abandoned lines the department states that some of them ought never to have been built, some ran to parks and other places no longer popular and some of them paralleled near-by railroad lines and were never a vital factor in transportation. The majority of the lines, however, were valuable arteries of travel and in many cases auto buses have been substituted for them. In the opinion of the department the value of these lines from the standpoint of the economic and social welfare of the public is a local question, best left for individual settlement to the communities most directly concerned.

The problem, however, involves not only the lines already abandoned, but the possibility that the future may see still further suspensions. This in the opinion of the department is the more serious part of the problem.

However, an optimistic note is sounded in the statement that the critical condition of the railways is largely, though by no means wholly, due to the war, and that it is not unlikely that very far-reaching economic changes may take place in the near future which will relieve the situation of some of its most acute phases.

EXTENSION OF EMERGENCY ACT RECOMMENDED

The principal legislation recommended is an act to enlarge and extend the emergency war-time statute which permits cities and towns in Massachusetts to contribute to the support of street railway lines. In this connection, the department states:

> We are aware of no reason why any community should not, if it deems it necessary for its welfare and convenience after careful consideration of the question, restore or prevent the discontinuance of street railway lines in its limits, either by acquiring such lines and running them as a public venture or by contributing toward their support from taxes. The question undoubtedly presents difficulties, but we cannot agree with one of the speakers who urged at a hearing on this matter that its complexity is a reason why the Commonwealth should assume jurisdiction over and responsibility for all the street railway lines in Massachusetts.
>
> If a street railway serves one particular community alone, the question of the discontinuance of its lines in that locality seems to us a question best dealt with by the particular people served. At any rate, we feel clear that this method should be given a fair trial before any more extensive experienment be made in the direction of the Commonwealth's assumption of obligation.
>
> This seems to us to afford not only the best measure of the necessity of such lines, but also the best machinery for meeting the situation in each locality. We believe, moreover, that the assumption of local burdens, rather than their abandonment, tends best toward the development of democratic institutions.

Other legislation was recommended dealing with cases where several communities may be involved, and one or more refuse to agree to the plan. A proposed act was also submitted, intended to abolish all charges for construction, maintenance or repairs to highways or bridges, and to abolish the commutation tax at present paid by the street railways.

Little Change in Albany Strike Situation

The strike of the employees of the United Traction Company, Albany, N. Y., entered upon its tenth week on April 2. The company has not yet opened all its lines and no move has been made by the men to bring the situation to a close, except the court proceedings to compel arbitration. The notice of appeal filed on April 2 in the Rensselaer county clerk's office by attorneys for the company from the order of Justice Howard to try the arbitration case on April 4 is expected to prolong the litigation.

In the meantime the company is going ahead hiring more permanent employees and the former places of the employees now on strike are gradually being filled.

The jitney situation still remains undecided, no action having been taken by the municipal authorities of Albany and Troy. The Supreme Court through Justice Hinman has stated its attitude as to the further operation of these vehicles in competition with the United Traction Company, declaring that their continued running without municipal consent or authority from the Public Service Commission is a violation of the penal law.

Officers of the railway conferred on April 2 with Mayor Watt and Corporation Counsel McManus regarding action intended to be taken by the city against the jitneys in view of the court's decision. It is understood the traction company is ready to supply additional affidavits for the purpose of enjoining other jitney owners and drivers from operating.

Chew as You Ride.—The Twin City Rapid Transit Company, Minneapolis, Minn., is testing candy and gum slot machines on four interurban cars.

Mr. Allen Arbitrator

Union Officials Reject Proposal of Clev land Railway for Wage Reduction and Other Changes

Negotiations looking toward a per cent reduction in pay for motorm and conductors on May 1 are now between the Cleveland Railway a officers of the local union.

On Feb. 1 the Cleveland Railw made a 10 per cent reduction in p for all officers and employees exce the trainmen, with whom there is agreement that does not expire un May 1. At that time John J. Stanle president of the company, issu bulletins to the trainmen informi them that he would cut their pay per cent on May 1 and also se elimination of the war-time emergen allowances regarding overtime, spre of runs, etc.

Cleveland motormen and conducto now get 70 cents an hour for the fir three months service, 73 cents an ho for the next nine months and 75 cen an hour after the first year.

In a formal demand on the uni Mr. Stanley announces a cut in wag to 55 cents an hour for the first thr months, 58 cents an hour for the ne nine months and 60 cents an hour aft the first year. This was the pre-w standard of wages. Mr. Stanley al demands the setting aside of the artic in the company's agreement with t union making certain allowances f overtime, spread of runs, etc. He lik wise insists upon the elimination Sec. 1, of the agreement providing th all trainmen employees of the compa must join the union and making pr vision for having the company colle union dues.

Officials of the union have refused meet Mr. Stanley's demands. Instea they have suggested that the matter arbitrated by the street railway co mittee of the City Council.

In reply to this Mr. Stanley h informed the union that the prese agreement provides a method f arbitration of the dispute. This cal for appointment by the company of arbitrator, appointment by the men an arbitrator, these two to select t third, or failing, to have the third m named by Federal Judge Westenhave

Mr. Stanley has named as his arbitr tor C. Loomis Allen, vice-president a general manager of the Syracuse Suburban Railway.

Since the developments just not the conductors and motormen have o fered to accept a reduction in pay 6 cents an hour starting May 1. Th offer was made to Mr. Stanley, by of cials of the union late on April 4 du ing the course of negotiations over M Stanley's demand for a wage reductio of 20 per cent. Mr. Stanley reject the men's offer, insisting that all h demands be arbitrated in accordan with the contract between the compan and the union. His demands are:

1. Reduction in basic pay of approx mately 20 per cent to a maximum 60 cents an hour.

2. Abolition of additional pay for Sunday, night and other difficult runs.

3. Abolition of the closed shop agreement.

A year ago the men refused to arbitrate the question of the closed shop and a strike resulted.

Officials of the union made their offer of a wage reduction of 6 cents an hour after Mr. Stanley had turned down an offer to accept a reduction of 3, 4, and 5 cents an hour. The officials of the union in making the offer explained that they would have to have the offer ratified by members of the union as they have so far received no authorization from members to make any offers.

A mass meeting of the members of the union has been called for April 13.

D. U. R. Defeated Again

Plea of Private Line for Service-at-Cost Fails to Impress Voters—Vote Very Heavy

With the preliminary reports received relative to the votes cast on the April 4 election on the two ordinances affecting the railway situation in Detroit, the Detroit United Railway's Service-at-Cost ordinance appears to have been defeated while the city ordinance providing for the purchase by the city of certain Detroit United Railway lines was carried by a large majority.

The first reports showed that the municipal ordinance appeared to be receiving support in every district of the city, none of the early precincts heard from opposing the plan to purchase the lines from the company. Based upon the first count of about one-tenth of the votes cast, coming from widely scattered precincts throughout the city, the company's ordinance appears to have been defeated by a vote of two to one.

Official figures announced on April 5 showed that every municipal question submitted to the voters at the election Monday had carried by a large majority. The piecemeal purchase plan carried by 65½ per cent vote, while the service-at-cost ordinance failed to obtain more than 35½ per cent affirmative vote. The vote on the service-at-cost ordinance was 52,918 for and 92,036 against. On the purchase ordinance the figures were, 96,539 for and 50,704 against.

Before the election on the service-at-cost ordinance, Elliott G. Stevenson, attorney for the Detroit United Railway, stated that the company has from the first conceded that the company's service-at-cost ordinance would require a 60 per cent affirmative vote. The question as to whether or not the three-fifths majority of the votes cast would be required to carry the ordinance was raised by the chairman of the election commission. It was pointed out that there was no expenditure of money involved and the question was raised as to whether the ordinance could be interpreted as a franchise. If it is a franchise then the 60 per cent majority is required.

Members of the commission stated that they believed that the Detroit United Railway had not asked for a ruling on the question. A decision by the Attorney General's Department was sought by the Chairman of the Election Commission. The Corporation Counsel declared that a 60 per cent majority would be necessary to carry the measure.

Large London Workshops

Both the London underground electric railway companies and the London General Omnibus Company are erecting large workshops for heavy repairs and overhaul on what has hitherto been market-garden land near Oction Town Station in the western outskirts of the metropolis. The policy is one of conconcentration and economy instead of having the work done as at present in a great number of smaller shops scattered over the London area. The railway companies' shops and yards will occupy about 64 acres, while the omnibus company has about twenty-six acres. The former set of shops and equipment will cost about £20,000, but large economies in operation are expected. It is hoped these shops will be ready early next year, while those of the omnibus company are to be finished in July next.

News Notes

Fire Started to Hide Crime. — The ticket office of the Niagara, St. Catharines and Toronto Railway, Niagara Falls, Ont., was recently gutted by fire. Two youths formerly employed as ticket agents have been placed under arrest charged with the theft of $1,000 of the company's funds, and they are alleged to have confessed that they robbed the company and then set fire to the ticket office to hide the crime.

Utility Rate Bill Opposed. — W. H. Johnson, vice-president of the Philadelphia (Pa.) Electric Company, has expressed disapproval of bills introduced in Pennsylvania giving the Public Service Commission power to suspend rates pending decisions. This and other matters of current interest were touched upon by Mr. Johnson at the Eastern Geographical section meeting of the Pennsylvania Electrical Association in Philadelphia on Feb. 24.

Home Rule Bill Lost.—The Oklahoma House in the closing days of the session killed on final roll call House Bill No. 178 which proposed to confer upon cities and towns jurisdiction over rates charged by public utilities. Had the bill passed it would have deprived the Corporation Commission of its control over rates for gas, electricity, water, telephones and street railway service, and would have turned this power over to the various city councils, city commissions and town boards of the state.

Another British Tidal-Power Scheme.—A report is now being prepared in Great Britain on a scheme to utilize the tides at Walney Island to supply electrical energy to the Barrow district of Lancashire, with its great industrial development. As with the similar project for the River Severn, even if all engineering difficulties were overcome, the cost of the enterprise would, conservative authorities think, be likely to prove prohibitive.

$4,000,000 Bridge Proposed.—Governor Warren T. McCray of Indiana has signed a bill authorizing the Governor to appoint a commission to co-operate with a similar commission to be created by the State Legislature of the state of Kentucky, the two commissioners to work out plans for the building of a bridge over the Ohio River at Evansville, Ind. The proposed bridge will be used for traction lines and railroads.

Wage Agreement Renewed Unchanged.—The employees of the Trenton & Mercer County Traction Corporation, Trenton, N. J., will receive the same wages for the coming year as have been paid. This is provided in the new working agreement between the men and company signed on April 2. Employees of cars where two men are used receive 50 cents an hour, while operators of one-man cars are paid 55 cents. The men have asked the company to change the "tripper" schedules.

Program of Meeting

International Railway Congress

Announcement has been made that the ninth congress of the International Railway Association will be held in Rome, Italy, from April 19 to May 1, 1922. Section VIII is that of electric traction. Seven papers will be presented on this subject, the topics being divided up among the different countries. The names and titles of the speakers follow:

Holland and Great Britain—J. W. W. Van Loenen Martinet, chief of electric traction for the Netherlands State Railways. Utrecht.

Belgium—Ernest Gerard, General honorary secretary to the Minister of Railroads, Marine, Posts and Telegraph in Belgium; Manager of the National Light Railway of Belgium, Brussels.

Denmark, Sweden and Norway—Mr. Ofverholm, chief of the Electro-Technical Bureau of the Swedish State Railways, Stockholm.

Italy—Alfredo Donati, engineer, chief of the special Electrification Commission for the General Management of the Italian State Railroads, Rome.

Switzerland—Emile Huber, chief of electrification of the Swiss Federal Railways, Berne.

America—George Gibbs, chief engineer of electric traction, Long Island Railroad, New York.

Other countries—Mr. Sabouret, chief engineer of technical service of the Orleans Railroad, Paris.

Financial and Corporate

Omaha Must Have More

Revenues Must be Increased or Expenses Decreased if Receivership Is to Be Avoided

The Omaha & Council Bluffs Street Railway, Omaha, Neb., is face to face with the necessity of reducing wages or increasing the rate of fare. The whole situation will be unfolded before the State Railway Commission, at Omaha, Neb., beginning May 2. Considerable interest is manifested in this forthcoming hearing at which the company will place its facts and figures on the table, feeling confident at this time that the real status of its financial affairs will result in the needed relief.

The case harks back to May, 1918, when the company first applied to the commission for an increase of fare, from 5 cents to 6 cents. The case involved many ramifications, such as a demand by the men for increased wages and a threatened strike. The commission, on Aug. 10, 1919, issued a temporary order, allowing the company to charge a 7-cent rate, with four tickets for 25 cents. This fare has been in effect since that date. In connection with that order, the commission directed the company to prepare a physical valuation report. This has been completed and will be introduced on the opening day of the hearing this month.

MANAGER FEARFUL FOR FUTURE

R. A. Leussler, vice-president and general manager of the company, points out that in 1920 his company lacked $31,586 of earning enough to pay the 5 per cent preferred stock dividend, and he added that no common stock dividends have been paid by the company for three years. In 1919 the earnings yielded $16,000 over the payment of preferred stock dividends. He further stated that the net earnings in 1920 were $48,816 less than in 1919.

During August, 1919, the wages of motormen and conductors were increased 10 cents an hour and during November of the same year another increase of 2 cents was allowed making a total of 12 cents an hour increase to the men since the fall of 1919. The present scale of wages is from 53 to 57 cents an hour.

"It is no secret," said General Manager Leussler, "that the company must increase its income or decrease operating expenses. We are going before the State Railway Commission on April 25 and let that body determine what is necessary. We must have an increase or go into the hands of a receiver. It is for the commission to say what the rate of fare should be."

The company states that it paid $2.90 per ton for coal during 1915 and that it paid $6.90 per ton in 1920. The total amount of taxes paid by the company last year was $427,861. It is further noted by the company that fares of 10 cents are being paid in 112 cities.

The City Council of Omaha has directed W. C. Lambert, corporation counsel, to represent the city at the hearing before the State Railway Commission and to engage necessary expert assistance.

$18.11 per Share Earned by North American Companies

Excellent results are shown in the thirty-first annual report of the North American Companies for the calendar year 1920 in spite of the difficult conditions under which all public utilities have operated in the last few years.

Gross earnings of the various companies amounted to $39,611,162, an increase of 30.64 per cent over 1919; balance for depreciation, common dividends and surplus was $5,396,288, an increase of 17.81 per cent, equivalent to $18.11 per share of North American stock before reserve, as compared with $15.38 in 1919.

A significant feature of the 1920 report is the small proportion, about 13 per cent, of net income of subsidiaries derived from electric railways operation. More than 71 per cent of net was derived from electric and heating, and the balance from coal and gas operations. This showing and the fact that the companies' entire investment in the United Railway, St. Louis, is carried on its books at $1 dispel any impression which may have prevailed that railway operation is the principal source of subsidiary net earnings.

Growth of the railway business of the Milwaukee Electric Railway & Light Company during the year is indicated by increases of 5.67 per cent, 13.34 per cent, and 13.86 per cent respectively in revenue passengers, car miles operated and car hours. During the year the Milwaukee Electric Railway & Light Company leased from the Wisconsin General Railway ninety-nine new city cars and forty one-man safety cars. The lease was assigned to the Fidelity Trust Company, Philadelphia, as trustee and the latter issued $1,090,000 of ten-year 8 per cent sinking fund equipment trust gold certificates, payment of the par value and dividends of which have been guaranteed by the railway and light company.

Under orders of the Railroad Commission of Wisconsin the ticket rate of fare within the single fare area of the city of Milwaukee was increased in June, and in October rates for electric and heating service were also increased.

Merger Actively Urged

Conference of Railway Representatives with Public Utility Members Suggested at Washington

In the hope that some plan may be evolved for the voluntary merging of the two railways in the District of Columbia, the Commissioners of the District have suggested that two representatives of the Capital Traction Company and two representative of the Washington Railway & Electric Company be appointed to meet with the Public Utilities Commission in an effort to determine how the companies may be consolidated.

ENABLING LEGISLATION DRAWN

It was revealed that the District commissioners practically have agreed to urge Congress to pass the Wood bill which would make the merger compulsory. That bill would substitue for the present tax of 4 per cent on the gross receipts of the railways an excess profits tax of 50 per cent of the net earnings in excess of a 6 per cent return on the amount at which the property is valuated. This would have the effect of relieving the Washington Railway & Electric Company from the payment of any taxes since its earnings probably would not exceed 6 per cent. The Capital Traction Company earns 10 per cent on its valuation.

The Wood bill also provides that the railways are to be merged before the Potomac Electric Power Company is taken over. The bill further relieves the railways from the payment of the salaries of crossing policemen and relieves them of the payment of certain paving charges.

These matters were discussed on April 4 at a conference at the capitol attended by members of the Senate and House committees on the District of Columbia, by the District commissioners and by representatives of the railways.

W. C. Kutz, chairman of the Public Utilities Commission, declared that the commission is opposed to the merger of the Washington Railway & Electric Company and the Potomac Electric Power Company unless it merely is a preliminary step toward the consolidation of the two railways. He expressed the opinion that a merger must be brought about if the railway fare is to be less than 8 cents.

MR. HAM SEES FARE REDUCTION

William F. Ham, president of the Washington Railway & Electric Company and of the Potomac Electric Power Company, declared it would be possible to reduce fares to 7 cents if the power company and the Washington Railway & Electric Company merge and the power company is allowed to charge 10 cents a kilowatt hour for electricity. Mr. Ham also contended that it is an injustice to the railways to require them to pay the salaries of crossing policemen and to pay for paving between tracks and for 2 ft. on each side of the outer rail.

Municipal Railway Falling Behind

$237,797 Lost by City Road on Basis of Comparison of Charges Borne by Private Company

The Municipal Railway, San Francisco, in its annual report for the year ended June 30, 1920, issued recently, shows interesting results. Although it earned $43,000 per mile of revenue track, or more than any year since Exposition Days in 1915, the cost of operation ate it all and more, so that actually operations for the year were conducted at a loss.

NET earnings from operations, according to the method of bookkeeping used on the municipal lines, actually showed a deficit of $6,350. If the comparison charges required by the charter, as shown in the table, are considered as being proper for a basis of comparison with privately owned companies that have to pay such taxes, the loss for the year would amount to $237,797. There was, however, a surplus of $100,110 on operation during previous years, so that the deficit under this basis of comparison would be but $137,687.

Incidentally it might be said that the Municipal Railway, with earnings from operation of $43,000 per mile of revenue track on a single-track basis, is exceeded by only one other strictly overhead trolley system in the country that operated on a 5-cent flat fare basis for the year ended June 30, 1920. Some other companies operating on a 5-cent fare basis were the United Railroads, San Francisco, with earnings of $32,700 per mile, the Brooklyn City Railroad with $46,000, the Louisville Railway with $28,000 and the Southern Boulevard Street Railway (New York) with $31,420 per mile of track.

STATISTICAL INFORMATION—MUNICIPAL RAILWAY OF SAN FRANCISCO

Year Ended June 30:	1920	1919	Per Cent Change
Track owned and operated (miles)	57.97	58.23	*0.436*
Track owned and operated cojointly with United R.R. (miles)	5.15	5.15	......
Carhouse tracks and sidings and unused spurs (miles)	4.00	3.95	1.265
Total (miles)	67.12	67.33	*0.312*
Average total miles of single track operated at end of year	63.12	63.38	*0.410*
Revenue car-miles	7,182,475	....	.....
Revenue bus-miles	236,797	....	.....
Total revenue miles	7,419,272	7,212,763	2.86
Revenue car-hours	....	....	....
Revenue bus-hours	....	....	....
Total revenue hours	795,578	779,746	2.03
Revenue passengers on cars and buses:			
Five-cent cash	53,645,764	47,524,125	12.90
Five-cent government ticket	66,904	69,262	*3.41*
Two and one-half cent school ticket	639,894	597,483	7.10
Two cent revenue transfers	600,296	856,166	*29.80*
Total revenue passengers	54,952,858	49,047,036	12.10
Free transfer passengers	10,757,504	9,836,127	9.34
Free passengers, employes, police, firemen, etc	458,884	458,090	0.17
Total car and bus riders	66,169,246	59,341,243	11.50

INCOME STATEMENT OF SAN FRANCISCO MUNICIPAL RAILWAY

Year Ended June 30:	1920	1919	Per Cent Change
Revenue from transportation	$2,702,289	$2,391,176	13.00
Revenue from other railway operations	10,147	10,222	*0.73*
Total railway operating revenue	$2,712,436	$2,401,398	12.96
Ways and structures	102,130	63,331	61.30
Equipment	186,947	147,446	26.75
Power	348,383	327,687	6.32
Conducting transportation	1,293,309	1,045,704	23.70
Traffic	666	264	153 00
General and miscellaneous	94,432	70,612	33.70
General and miscellaneous (comparison charges)	4,912*	10,904	*55.00*
Depreciation (14 per cent of passenger revenue)	378,429	334,867	13.00
Accident reserve (4 per cent of passenger revenue)	108,122	95,676	13.02
Total operating expenses	$2,517,330	$2,096,491	20.03
Net operating revenue	195,106	304,907	*56.30*
Taxes (comparison changes required by charter):			
State franchise (5.25 per cent operating revenue)	142,488	126,155	12.95
Municipal franchise (3 per cent passenger revenue)	81,092	71,757	13.00
Municipal car license ($15 per car)	2,955	2,955	......
Federal taxes (1 per cent net income)	....	....	......
Total taxes	$226,535	$200,867	12.85
Operating income	*31,429*	104,040	*129.8*
Non-operating income	27,405	22,248	23.15
Gross income	*4,024*	126,288	*103.2*
Bond interest	233,773	243,093	*3.84*
Net income transferred to profit and loss	*237,797*	*116,805*	103.7
Surplus at beginning of year	100,111	216,916	*77.4*
Surplus at close of year	*137,686*	100,111	*237.80*

* Nothing allowed for legal and office expense.

The appended tables really speak for themselves, but in order to determine what became of all the money earned comparative figures are printed from the report of the United Railroads, San Francisco, for the same period.

COMPARISON OF OPERATIONS —YEAR ENDED JUNE 30, 1920

	United Railroads of San Francisco					Municipal Railway of San Francisco				
	Actual	Per C.-M. Cents	Per C.-H.	Per Cent of Operating Revenue	Per Cent of Operating Expense	Actual	Per C.-M. Cents	Per C.-H.	Per Cent of Operating Revenue	Per Cent of Operating Expense
Passenger revenue	$8,938,987	34.85	$3.08	99.30	......	$2,702,289	36.41	3.399	99.63	.....
Revenue from other railway operations	63,124	.34	.02	0.70	.....	10,147	.14	.013	.37	.....
Total operating revenue	$9,002,111	35.19	$3.100	100.0	......	$2,712,436	36.550	3.412	100.00	.....
Way and structures	423,853	1.651	$0.145	4.69	6.62	$102,130	1.374	$0.128	3.76	4.06
Equipment	548,955	2.140	.189	6.09	8.58	186,947	2.520	.235	6.90	7.44
Depreciation	(*a*)	......	......	......	......	378,429	5.099	.476	13.98	15.08
Total maintenance	$972,808	3.791	$0.334	10.78	15.20	$667,506	8.993	$0.839	24 64	26.58
Power	1,357,225	5.300	.467	15.05	21.20	348,383	4.700	.438	12 86	13.87
Conducting transportation	3,471,854	13.550	1.194	38.55	54.20	1,293,309	17.420	1.628	47.65	51.40
Traffic	....	......	......	......	......	666	.009	.001	.03	.02
General and miscellaneous	....	......	......	......	......	202,554	2.730	.254	7.49	8.06
Add general miscellaneous comparison charge	....	......	......	.....	......	4,912	0.066	.006	0 16	0.19
Total general and miscellaneous	$695,874	2.720	$0.240	7.72	10 87	$207,466	2.796	$0.260	7.65	8.25
Credit transportation for investment	*94,463*	*0.368*	*032*	*1.05*	*1.47*	....	......	......	......	.....
Total operating expenses	$6,403,298	25.000	$2.205	71.18	100.00	$2,517,330	33.918	3.166	92.83	100.00
Net operating revenue	2,598,813	10.190	.895	28.82	40.60	195,106	2.632	.246	7 17	7.76
Taxes	513,200	2.005	.176	5.17	8.02	226,535	3.058	.284	8 36	9.02
Net earnings	$2,085,613	8.185	$0.719	23.65	32.58	*$31,429*	*0.426*	*$0.038*	*1.19*	*1.26*
Revenue miles	25,610,023	......	8.84	......	......	7,419,272	......	9.32	......	.....
Revenue hours	2,906,503	......	......	......	......	795.578	......	......	......	.. .

(*a*) Included in two previous maintenance accounts.

Banks in Indiana Boom Utilities

The Fletcher American National Bank, Indianapolis, Ind., has been running a series of advertisements in the newspapers telling facts about the city and emphasizing the importance of utility companies in community life. The theory of the bank offering these advertisements is that anything that is good for the city is good for the banking business.

The advertising has attracted considerable attention, but no more than a series published by the First & Hamilton National Bank of Ft. Wayne, Ind. This bank has recently printed a series of twenty advertisements under the heading, "For Greater Ft. Wayne." Mr. Warden, president of the bank, commenting on the "ad," said that the bank believes that it is essential to the growth of Ft. Wayne that people not only take a pride in their public utilities but that they understand better that these utilities must have an adequate return on the investment in order to operate soundly.

Reports of Clark Properties Summarized

Corporations under the E. W. Clark management, Philadelphia, Pa., have reported for the year ended 1920. The Commonwealth Power, Railway & Light Company, controlling properties in the Central West, shows a balance of $797,738 available for renewal, dividend requirements, etc. This is 40 per cent less than the balance of the company for 1919. This decrease is attributed to the increase in wages and to the advance in the cost of coal. Among the other companies reporting are the Bangor Railway & Electric Company, Nashville Railway & Light Company, East St. Louis & Suburban Company, Portland Railway, Light & Power Company and the Cumberland County Power & Light Company. The results of operation of these companies are shown in the accompanying table.

The most appreciable increase in balance was shown in the report of the East St. Louis & Suburban Company where the surplus for 1920 was greater by 5,000 per cent than that of 1919. On the other hand the Commonwealth System showed the greatest decrease in balance. In the case of this company the change amounted to 40 per cent.

Allowances for depreciation were increased materially in the cases of three companies. The Bangor Railway allowed $66,742 for depreciation for 1920 against $58,590 for 1919. The East St. Louis & Suburban Railway allotted $359,417 for depreciation in 1920 against $274,139 for the twelve months of 1919. The Portland Company included in its expenses for 1920 $242,002 for depreciation as contrasted with $257,727 for the same period a year ago.

Actual Worth Valuation

Governor Miller Says Franchise and Going Value Will Not Be Allowed in Readjustment

Frederick L. Cranford, chairman of the Transit Committee of the Brooklyn Chamber of Commerce, has received a letter from Governor Miller of New York in which he states the actual value of the property of the traction companies in New York, and not their franchises and going value, will be considered in any plan of reorganization undertaken by the Transit Commission to be appointed under the traction bill signed recently.

The Brooklyn Chamber of Commerce, through Chairman Cranford, sent Governor Miller a letter on March 16, in which the statement was made that although through the Governor's action the railway matter would be treated as an economic problem apprehension in the minds of the public revolved about three points:

1. The personnel of the commission which it is proposed to create;
2. The possibility of an increase in the present rate of fare;
3. The valuation of the property of the railway companies.

On the valuation matter the chamber said:

> Respecting the basis for the valuation of any physical property of the companies which is to be considered in any plan for a unified system it is our belief that the property thus acquired should be confined to that useful and needed for the operation of the lines in such a system and should not embrace any property of lines whose utility has been superseded; it is assumed that the appraisal will be based on the condition of the property as of the date it is acquired, and its first cost and not upon inflated values.

The Chamber of Commerce then asked the Governor to clear up these points as they could not be explained in the traction bill. In reply the Governor wrote to Mr. Cranford on March 30 in part as follows:

> All the bill does, which is said to be so radical, is to prevent obstruction to the efficient exercise of those powers.
>
> I can assure you that nothing but fitness will be considered in the selection of the commission.
>
> I trust that only such properties will be included in any plan of reorganization as are and will continue to be needed in the public service, and that all properties will be valued at their real worth for such service. No rule could safely be prescribed by statute. The cost of production rule would undoubtedly be unjust to the public at the present time.
>
> The statute excludes franchise and going values. There is no injustice in that, because bankrupt properties can hardly possess such values. The question is what are these properties fairly worth in their present condition for the purpose of reorganization and rehabilitation. It will not require as much time to decide that question as it would to go into the last detail of values, which is ordinarily done in rate cases. As you say the question is one to be decided upon business principles by men of judgment.
>
> The consideration to security holders for the concessions required of them will be a security with an assured fair return in place of one with uncertain or no return. Necessarily, therefore, the rate of fare will be an important element of any settlement and cannot be determined in advance thereof, certainly not in advance of the deposit by the companies of the necessary consents to clothe the commission with ample power to put into effect whatever plan may be determined upon.
>
> The task before the commission is not an easy one. I feel confident that it can be done if approached with resolution, courage and the determination to do exact justice. There must be no such haggling over terms as has attended prior negotiations. The commission must first decide what is just and fair and then insist upon that, no more no less.

Jitneys Collect $350,000 a Year in Seattle

According to a report to Mayor Hugh M. Caldwell by David W. Henderson, superintendent of the Seattle Municipal Street Railway, jitney buses have flourished in Seattle since fares on the railway went up to 8⅓ cents. A one-day check indicates the jitneys are taking nearly $350,000 a year in revenues from the municipal railway. The report is based on a check made by the railway department Jan. 26, compared with a similar check made Oct. 14 last year.

The summary, covering all the jitney routes except the Rainier Valley line, which was omitted because the city does not operate that traction line, shows 1,659 trips were made by buses Jan. 26, as against 1,482 Oct. 14; that 9,522 passengers were hauled Jan. 26, as against 7,877 Oct. 14. This represents an increase of 177 in number of trips, or 11.9 per cent, and an increase of 1,645 in the number of passengers, or 20.9 per cent. At 10 cents each the Jan. 26 receipts of the jitney operators were $952.20, or approximately $347,553 a year.

	Commonwealth Power, Railway & Light Co. System			Bangor Railway & Electric Company			Nashville Railway & Light Company		
	1920	1919	Increase or Decrease, per Cent	1920	1919	Increase or Decrease, per Cent	1920	1919	Increase or Decrease, per Cent
Gross earnings	$31,285,981	$25,964,899	20.5	$1,262,779	$1,094,675	15.4	$3,675,209	$3,224,384	14.0
Operating expenses and taxes	22,390,298	17,029,303	31.5	800,777	656,598	22.0	2,979,332	2,436,296	22.3
Net earnings	$8,895,683	$8,935,596	— 0.4	$462,002	$438,077	5.5	$695,877	$788,088	—11.7
Interest, etc.	7,020,765	6,516,468	7.7	263,707	253,111	4.2	479,326	475,146	0.9
Balance	$1,874,918	$2,419,128	22.5	$198,295	$184,966	7.2	$216,551	$312,942	—30.8
Pfd. stock div.	1,077,180	1,077,180	....	105,000	105,000	....	125,000	125,000	....
Balance	$797,738	$1,341,948	—40.6	$93,295	$79,966	16.7	$91,551	$187,942	—51.3

	East St. Louis & Suburban Company System *			Portland (Ore.) Railway, Light & Power Company			Cumberland County (Me.) Power & Light Company		
	1920	1919	Increase or Decrease, per Cent	1920	1919	Increase or Decrease, per Cent	1920	1919	Increase or Decrease, per Cent
Gross earnings	$4,368,922	$3,213,152	36.0	$9,564,615	$8,591,001	11.3	$3,114,008	$2,768,600	12.5
Operating expenses and taxes	3,318,196	2,539,504	30.7	6,509,505	5,491,493	18.5	2,142,834	1,813,934	18.1
Net earnings	$1,050,726	$673,648	56.0	$3,055,110	$3,099,508	— 1.4	$971,174	$954,666	1.7
Interest, etc.	651,775	667,523	— 2.4	2,268,267	2,269,972	— 0.1	667,483	672,252	— 0.7
Balance	$398,951	$6,125	....	$786,843	$829,536	— 5.1	$303,691	$282,414	7.5

* Not including Alton Granite & St. Louis Traction Company and Alton Gas & Electric Company.

Ohio Interurban Road Suspends

Inability to make enough money to pay its power bills has caused the Sandusky, Norwalk & Mansfield Electric Railway, Norwalk, Ohio, to discontinue service. The road stopped operating at midnight on March 25. The line owed the Cleveland & Southwestern Railway $9,000 for power furnished during the past six months. State Representative C. G. Taylor has been receiver for the Sandusky, Norwalk & Mansfield line ever since 1913.

Cessation of service on the line has left a score of small communities without any traction service and hundreds of people have to go 5 and 6 miles to reach a steam railroad. The road also carried many school children each day. Scores of customers, including a co-operative farmers elevator and a foundry at North Fairfield have been left without electrical energy by the cutting off of power. The farmers hope, however, that a new syndicate will be formed to resume service on the line.

High wages to trainmen did not cause the road's financial difficulties as the conductors and motormen have been receiving only 35 cents an hour, compared with 66 cents an hour paid by electric interurbans in adjoining territory.

Receiver Taylor made every effort to operate successfully but without result. He said that when the line was built it was financed by the issuance of $800,000 of bonds, with $800,000 of the stock given as a bonus. He adds that so far as he has been able to ascertain less than $400,000 in cash found its way into the property. The line operated 33 miles of track.

2,000,000 Passengers a Year on Municipal Line at Present Rate

The Street Railway Commission of Detroit, Mich., has announced revenues of approximately $9,939 on the operating municipal ownership lines in Detroit for the month of March when 198,789 passengers were carried. This compares with $7,832 for February. The March passenger rate is in excess of 2,000,000 passengers per year. Figured on a daily basis, the average daily revenue during the last half of March showed an increase of 14 per cent over February traffic.

The Board of Assessors has been asked by the Street Railway Commission to place the municipal lines on the tax rolls this year, and it is the contention of the commission to tax the municipal ownership lines by the same method of valuation used in the case of the Detroit United Railway.

The figures relative to the Detroit United Railway earnings since last December have not been given out by the company. Following the annual meeting of the company in February, it was announced that the figures would be made public about April 10, which would be after the election at which the service-at-cost ordinance was to voted upon.

According to a statement by Corporation Counsel Wilcox the audit of the company's account up to December, by special city accountants, shows that the amount of income used to meet the increase in pay of the platform men for which the charging of additional fare was permitted, had dropped from $156,000 to $120,000 from July to December. This is held by city officials to indicate the extent of the cut in service made by the company.

Financial News Notes

Receiver Makes Interest Payments.—By authority of the federal court E. Stenger, receiver for the Denver (Col.) Tramway, has paid interest obligations and sinking fund requirements amounting to $196,650 which became due on March 1 and April 1, 1921, on four of the company's bond issues.

Court Sanctions Interest Payment.—Fearing that the taking over of city street railway lines at Lima would interfere with the operation of the Ohio Electric system, Receiver B. F. Jones secured an order from federal court at Toledo granting permission to pay $8,750 interest due April 1 on $350,000 of second mortgage bonds held in trust by the Fidelity & Trust Company, Buffalo, N. Y.

Toledo Deficit Exceeds $100,000.—The deficit in operating expenses and consequent drain on the stabilizing fund at Toledo, Ohio, have reached above the $100,000 mark now. The next report of the Community Traction Company will be issued on April 11. Many improvements suggested by Commissioner McCann and increased industrial activity in the city are counted on to change this condition.

Additional Rapid Transit Bonds Authorized.—The Board of Rapid Transit Commissioners of Cincinnati, Ohio, has approved a bond issue of $1,500,000 at 5 per cent interest, maturing in fifty years, with a twenty-five-year optional redemption. The issuance of these bonds will bring the total of bond issues for the rapid transit work up to $4,000,000, of which $2,500,000 already has been issued.

Bonds Extended at Increased Interest.—The $500,000 of Portland Lighting & Power Company, Portland, Me., first mortgage 4½ per cent bonds due April 1, 1921, have been extended to April 1, 1931, at 7 per cent. The Cumberland County Power & Light Company now owns the Portland Lighting & Power Company. Sufficient of the Cumberland County first and refunding 5 per cent bonds due 1945 are set aside and held for the retirement of these bonds, but under present financial conditions it is quite impossible to sell long-term 5 per cent bonds except at considerable sacrifice. Consequently the Cumberland company decided to extend the time of payment. A cash bonus of $15 on each $1,000 in bonds will be paid to each holder agreeing to the extension.

Hull Loses Trolley Service.—The last car of the Eastern Massachusetts Street Railway to operate in the little town of Hull made its final trip on April 4. The trustees operating the company had notified the town officials that failure to appropriate the necessary $4,000 to meet the operating deficit would result in suspension of railway service. The town fathers evidently had made other arrangements which seemed to them preferable, for they withheld the desired appropriation, and the day following the cessation of railway service, a line of auto buses commenced to operate over the former railway route.

Certificate of Stock Increase Filed.—The Interstate Public Service Company, which recently took over the utilities corporations in New Albany and Jeffersonville, Ind., including the electric lines to Louisville, has filed in the office of the Secretary of State, Indianapolis, a notice of the increase in the capital stock of the company from $8,000,000 to $15,000,000. Of the stock $10,000,000 is common and $5,000,000 preferred. Companies which have been taken over by the interstate company are the Louisville & Southern Indiana Traction Company, the Louisville & Northern Railway & Light Company, the United Gas & Electric Company of New Albany and Jeffersonville, and the New Albany Water Company. The filing of the certificate is a formality in connection with the deal referred to at length previously in the ELECTRIC RAILWAY JOURNAL.

Cities Service to Double Common Stock.—At the annual meeting of Cities Service Company, New York, N. Y., on April 26, stockholders will be asked to approve an increase in the authorized amount of the common stock of the company from $50,000,000 to $100,000,000, the purpose of the increase being to provide additional common stock for regular stock dividends on the common stock, conversion of outstanding debentures and for other future corporate requirements. Cities Service Company has outstanding $29,192,592 principal amount of convertible debentures, these debentures being convertible partly into Cities Service Company preferred stock and partly into Cities Service Company common stock. In addition, Cities Service Company is now paying stock dividends at the rate of 15 per cent a year in common stock at par on the common stock. Of the present authorized $50,000,000 common stock of the company, $47,985,798 had been issued up to March 10, 1921. In addition to other routine business, stockholders will be asked to authorize, or approve, the action of the directors in making a new contract with Henry L. Doherty & Company as fiscal and operating agents of Cities Service Company, the present contract expiring on May 1, 1921. The annual report of the company for 1920 will be ready April 15.

Traffic and Transportation

Jitneys Off Railway Streets

Kansas City, Mo., Finally Gets Around to a Measure of Reasonable Regulation

A forward step toward such adjustment and regulation of transportation facilities as will best serve the entire community has been taken by Kansas City, Mo., in the passage of an ordinance confining jitneys to streets upon which there are no regularly operated electric railway lines.

The ordinance uses the term "street cars." Following is the paragraph containing the prohibition:

> Section 1. No person, firm or corporation shall drive, run or operate any "jitney" upon or along any street, avenue or roadway within the limits of Kansas City, Mo., upon which there is located a street car track or tracks upon and over which street cars are regularly operated; provided, nothing herein contained shall be construed as prohibiting any "jitney" from crossing any such street, avenue or roadway.

Under other ordinances jitneys must operate only over routes prescribed by a "jitney inspector," a city official. New routes, away from street car lines, are therefore being designated by the inspector and assigned to the various jitney operators; routes of existing jitney lines are readjusted where possible.

The jitney men's association has announced that it will oppose the ordinance by legal steps. Injunction proceedings were brought before a court of the county at Independence, Mo., on March 26 to restrain city officials from enforcing the prohibitory ordinance. The temporary restraining order was issued, returnable on April 2.

Although jitneys have been kept off some of the streets in the down town congested district they have not been regulated in outlying districts. The result is that jitneys have customarily paralleled street car lines and sniped passengers. At first the jitney service was run catch-as-catch-can, but the operators have now been organized for several years and they are preparing to present a united front against the new ordinance and against other regulatory measures.

The jitney association has regulations for the control of its members, enforced by fines and other penalties. These regulations are such as might be imposed by ordinance, though some of them are apparently outside the province of city control. A court is maintained of members before whom offending operators are brought for trial. A jitney patron, another jitney operator, or any person may bring charges against an operator. If the charges are sustained the operator is fined; or, in serious cases, his membership is canceled. Discourteous treatment of patrons, careless driving, violation of traffic rules and similar matters are covered in these hearings.

The possession of a regular revenue enables the association to pursue certain lines of investigation toward improvement of operating factors. One inquiry conducted has resulted in the design of a standard coach body and chassis with a capacity of 15 passengers on 1½-ton chassis. Several coaches made to these specifications have been built to the order of the operators. The ultimate result of standardization efforts was expressed by a jitney association official as follows:

> The operators who can afford the new coaches will buy them; the association will see to it that the owners of these coaches have the favored opportunity on routes. They will get more business because they can give better service. Earning more they will attract the attention of investors, through whom as well as through purchases by other jitney operators the number of standard coaches in service will steadily increase. The next development will be the combining of interests by a few jitney operators; and then will come the consolidation of all the interests under one corporation.

Much publicity is being given to the difficulty encountered by the jitney inspector in selecting routes that will not be objected to by property owners. This situation is being used to advantage to indicate the bitterness of the "fight against jitneys" and the predicament into which the new ordinance has plunged the association.

In a further development of the "location" program there is a reported plan of the jitney inspector to route some jitneys through "Petticoat Lane," or Eleventh Street, the chief shopping thoroughfare in the midst of the retail district—the only downtown east-west street without car tracks. There is only one street north and south in the congested business district without car tracks, Baltimore Avenue, and this street is now a jitney route. Opposition to making of Petticoat Lane a jitney thoroughfare is expected from merchants and public. This hostility is expected to demonstrate further any weaknesses of the new ordinance.

Ten-Cent Fare Suspended

Pending inquiry into the reasonableness of the proposed 10-cent fare on the Princeton line of the New Jersey & Pennsylvania Traction Company the Board of Public Utility Commissioners has issued an order suspending the increase until July 12. The company in submitting the petition for the increase intended that the 10-cent fare should go into effect April 12. The first hearing on the company's application will be held at the State House on April 19. The commission recently replaced a short time ago refused the company permission to increase the fare 1 cent in each zone.

Increased Fare Continued

City of Columbus Insists, However, that $750,000 a Year Be Spent for Improvements

The Columbus Railway, Power & Light Company, Columbus, Ohio, has not as yet taken action looking to the acceptance of the extension of the present rate of fare voted by Council a few weeks ago. Council passed an ordinance authorizing extension of the present rate over the period of the blanket franchise, expiring April 3, 1926, thus amending the section under which the company was authorized to charge a fare of 6 cents cash, or 5 tickets for a quarter, for the period ending in April, 1922, after which the rate was to be reduced to 5 cents cash, or six tickets for a quarter.

6-Cent Fare Necessary to Restore Credit

The 6-cent fare was extended in response to the company's showing that under the old rate of eight tickets for a quarter it could not restore its credit, make any of the improvements demanded by the Council, or even continue the existing schedule of service. The restoration of normal conditions in the affairs of the company was shown to be impossible if the fare were to be reduced in 1922, for eastern bond houses had agreed to finance required improvements and extensions only if the Council agreed to extend the period of the increased fare.

In return for the authority to continue the present fare during the life of the blanket franchise, the Council asks the company to guarantee that it will expend not less than $750,000 a year for service improvements, extensions, betterments and additional trackage. It is this guarantee which has not yet received the sanction of the company's directors.

Paving Program Held Up

Charles L. Kurtz, president of the company, has been in Mexico for a number of weeks and has just returned. He declared, since his return, that the board of directors are to hold a meeting within a few days to consider the ordinance, and to arrange to meet the conditions of the extension of fare if it could be done.

Much of the work required of the company consists of new paving of Columbus streets and laying of new lines. Paving programs contemplated by the city are being held up pending the company's report of its ability to finance the improvements demanded of it, and to effect such financing its officials must show the security companies that the company's revenues will be adequate to secure any indebtedness which it may incur.

By the terms of the ordinance passed recently the Council will determine whether the company lives up to any agreement which may be reached as to the amount to be expended during the remaining years of the franchise.

Anomaly in Cleveland Suburban Fare Case

Less than 10 per cent of the car riders of Lakewood, Ohio, are now paying a 6-cent fare for their rides to and from Cleveland, although that is the rate the Cleveland riders all must pay, in addition to a cent for a transfer.

At the request of city officials of Lakewood the Common Pleas Court of Cuyahoga County has issued an injunction restraining the Cleveland Railway from demanding a 6-cent fare in Lakewood because the city of Lakewood has a franchise calling for a 5-cent fare.

Up to the time the Lakewood officials obtained the injunction more than 90 per cent of the Lakewood car riders were voluntarily paying the 6-cent fare. The date for a hearing on a permanent injunction has not as yet been fixed by the court.

Car riders who board cars inside the city limits of Cleveland and ask for Lakewood transfers must pay a 6-cent fare, plus 1 cent for a transfer. The court made this amendment to its ruling because some local Cleveland riders were taking advantage of the situation and riding for 5 cents by merely asking for a Lakewood transfer. Lakewood riders, on payment of the 5-cent fare, may transfer to the Cleveland lines without paying a cent for a transfer.

The City Council of Cleveland is threatening to require the railway to cut service to Lakewood, but the Cleveland Railway insists that it will have to obey the court's order and its franchise terms, allowing Lakewoodites to ride for less than Cleveland car riders pay, despite a much longer haul.

Subway Suggested for Seattle

As a result of a study of the transportation problem confronting the city of Seattle, Wash., and of the suggestion of a possible solution of the matter through the construction of a system of elevated railroads and subways, City Engineer A. H. Dimock has submitted to the Mayor and City Council a report covering the subject. The report is signed by Engineer Dimock, Major Carl H. Reeves, Superintendent of Public Utilities, and D. W. Henderson, Superintendent of Railways. The proposed rapid transit plans are not submitted for immediate action, but merely to start discussion and planning on the subject. The project is one of "purely academic interest" at this time, according to Mayor Hugh M. Caldwell.

The plan, in brief, provides for the concentration of traffic from several surface routes in the Third Avenue subway, and to provide stations where passengers may be transferred from surface cars to the trains. Six stations are proposed at advantageous locations. Trains would be operated from these stations on surface routes set apart for their special use. The possible use of motor buses is considered in the plans.

The report states that a possible saving of $1,200,000 over the present plan of operating entirely on the surface may be effected by the proposed system.

Short Skirts Do More than Attract Attention

While the reformers may go about pranting and objecting to the short skirts, the Jacksonville (Fla.) Traction Company has found that the new style dresses have their place in finance. Anyway, the railway at Jacksonville is strong for the "knee-high models." They prevent accidents. There's your reason.

J. S. Harrison, claim agent for the company, announces that the accident figures for 1914 showed 180 accidents in which women figured while boarding or alighting from cars. With the gradual raising of the fair one's skirts has come the same gradual lowering of the number of women-accidents, through the succeeding years until 1920 when, Mr. Harrison reports, there were only seventy-three accidents in which women were involved.

The heel of the shoe catching in the skirts used to be the principal cause of accidents to women, according to Mr. Harrison's figures, but with short skirts at the "height of fashion" there "ain't no such" accidents—except once in awhile where the fair one has turned her back on Dame Fashion. No longer do the ladies have to watch their step. It is the men that may now be found doing that—watching the ladies step.

Expect Increased Rates to Be Sustained

The private bills committee of the Ontario Legislature has approved a bill prepared by the Public Utilities Commission of the city of Port Arthur, allowing the commission to collect a fare commensurate with the cost of service provided the matter is subject to a vote of the ratepayers of the city of Port Arthur and approved by the Ontario Railway & Municipal Board.

The first step in this matter dates back to September, 1920, when the fares were increased to 7 cents cash or four tickets for 25 cents, notwithstanding the statutory limit specified was a 5-cent fare. Soon after placing the new rate into effect the Ontario Railway & Municipal Board declared the rate was illegal and ordered the commission to revert to the old fare.

An appeal was taken to the courts and while the matter was pending the commission prepared the bill mentioned previously. Under this appeal the Public Utilities Commission is continuing to charge the increased fare. It is expected that the Provincial Legislature will pass the bill and that it will become a law with the assent of the Lieutenant Governor in Council some time during June of this year. This will enable the commission to decide upon a rate of fare commensurate with the cost of operation and submit same to a vote of the ratepayers.

Unfair Bus Competition Prevented in Toledo

The City Council at Toledo, Ohio, has passed the bus regulatory measure, but the indemnity bond amounts and license fees were trimmed down by an amendment to the original bill.

The ordinance now requires that buses carrying up to ten passengers must post a $5,000 indemnity bond; those with a capacity of ten to twenty passengers a bond of $7,500; and those above twenty-passenger capacity a bond of $10,000. The license fees for these three classes of buses are $50, $75, and $100, respectively. The drivers license is $1. Originally the ordinance carried amounts from two to three times greater than these. Street Railway Commissioner Wilfred E. Cann and other railway officials believe that the regulation will help to remove some of the ruthless competition of the buses with the railway. The buses have been taking away more than $700 a day from the railway where pavements are good and hauls conducive to short trips.

Improved Traffic Control Proposed for Chicago

Inspired by traffic control methods which they investigated in several Western cities on a recent tour members of the local transportation committee of the Chicago City Council on March 31 voted to recommend their adoption locally.

Experiments will be made at six intersections in the down-town district with a semaphore system similar to that used in Los Angeles. A survey of down-town streets will be made with a view to designating their use for heavy vehicles or automobiles, and also for the possibility of eliminating left-hand turns. It is likely also that certain portions of the space under Michigan Boulevard where it is elevated will be set aside for parking of automobiles, to keep them off the crowded streets.

The local transportation committee also studied results under municipal operation of the electric railway lines in Seattle and San Francisco. It will report on this in the near future.

Jersey Jitney Bill Repassed

Governor Edwards of New Jersey on April 4 vetoed the Elliott bill, placing jitney buses under control of the State Public Utility Commission. He said:

> I am opposed to the measure for the reason that I think the matter of regulation of a local conveyance such as jitneys should be left with the local authority which, in my judgment, is better informed and better equipped to handle the problem. To delegate this work to the utility commissioners would be to increase the work of an already over-burdened board.

The measure placed under the jurisdiction of the utility board all auto buses or jitneys, the routes of which parallel upon the same street the line of any street railway or any other utilities, thus giving to the commission control of all jitneys in the state.

The bill has since been repassed by both houses over the Governor's veto.

So the Public May Know

Cards bearing the names of conductors are being displayed prominently in all the cars of the Monongahela Valley Traction Company, Fairmont, W. Va. An officer of the company explains:

> Courteous treatment always causes a desire on the part of the traveling public to know the names of the crew. There are many occasions when patrons come to us with praise for a conductor, but they do not know his name and do not remember his number. Because of this failure we are unable to let the conductor know that he is being appreciated. On the other hand, the company sometimes has in its employ conductors who are not courteous or who do not give good service. The cards will provide patrons names of these men so they can be reported.

Transportation News Notes

Increases Asked in New Castle.—The Sharon & New Castle Street Railway, New Castle, Pa., has filed a new tariff of rates with the Public Service Commission naming one way and commutation fares between Hubbard, New Bedford and New Castle.

Wheeling Work Divided Up.—Starting with the last week of February every crew working for the Wheeling (W. Va.) Traction Company, with the exception of the men on the Wheeling and Steubenville division, is being worked on six days a week. The company in this way is able to keep its extra crews employed by dividing up the work.

More Trailers for London.—Sanction has been given by the Ministry of Transport to the use of trailer cars on twenty-two additional routes of the London County Council Tramways. This is a material concession, as hitherto trailers have been allowed on only a very few routes. The capacity for coping with the morning and evening rushes of traffic will be very much enhanced.

Police and Firemen Ride Free.—Mandate has recently been served on the Seattle & Rainier Valley Railway to let policemen and firemen ride free, and to refund all fares collected from them. Service was made by Sheriff Matt Starwich, for Thomas J. L. Kennedy, assistant corporation counsel. The action was taken when the Supreme Court denied the company's motion for a rehearing in the case, which the Supreme Court decided in favor of the city.

Five-Cent Fare Continued.—The City Council of Akron, Ohio, under suspension of rules, on March 29 passed an emergency ordinance renewing the 5-cent cash fare ordinance for the Northern Ohio Traction & Light Company, which expired April 1. The 5-cent fare will be continued on city lines until July 1. The negotiations between the company and the city looking toward relief for the railway through an increase in fare have been reviewed previously in the ELECTRIC RAILWAY JOURNAL.

Skip Stops Go at Des Moines.—Des Moines has abandoned the skip stop after three years. Without previous announcement the Des Moines City Railway, through F. C. Chambers and Homer A. Miller, decided to restore the old system the day the change was advertised. There has been almost constant complaint against the practice ever since it was adopted and with the competition being furnished by the buses, which stop upon signal from a passenger, regardless of his location, the receivers for the railway thought it best to do away with the plan.

Southern Company Seeks Increased Rates.—The Columbia Railway, Gas & Electric Company, Columbia, S. C., has applied to the State Railroad Commission for permission to increase fares between Columbia and Camp Jackson. The company is asking for a rate of 2 cents a mile which would mean a 14-cent fare instead of the present 10-cent rate. In its petition the company claims that the returns do not meet the operating costs. The railway is also planning to discontinue the privilege of free transfers. In the city of Columbia the present fare is 7 cents.

Commission Inspector Reports on Crowding.—H. C. Eddy, with a corps of inspectors from the Board of Utility Commissioners of New Jersey, recently investigated the service of the Trenton & Mercer County Traction Corporation and in a special report announced that the one-man cars were overcrowded, and that cars with a capacity of fifty passengers frequently carried as many as seventy-seven people. The inspectors state that the overcrowding of the cars disarranges schedules and decreases safety. It is suggested that the inspectors of the railway should be so distributed as better to handle the crowds. Lack of co-operation on the part of a number of platform men is considered another obstacle. A recommendation has been made that patrons of the railway be required to have the exact fare ready when they board the cars or be made to pay 10 cents for a ride.

Six-Cent Fare Continued.—The Public Service Commission of Indiana has issued an order allowing the Public Utilities Company, operating the city lines at Evansville, to continue the 6-cent fare. In doing this, the commission said that an examination of the company's operating statement for the last three months of 1920 indicates the present fares "have not been sufficient to yield a reasonable return on the value of the property over and above the necessary operating expenses." The 6-cent fare went into effect in Evansville when prices were at the peak as a temporary measure and has been extended from time to time by the commission. When the hearing was held which resulted in the granting of a 6-cent fare, the company contended that it was realizing only a negligible return on its investment over and above operating expenses. The city attorney of Evansville contended that the company placed the value of its property too high. The company introduced as evidence the valuation by a private engineering firm, hired by the company. While the fare remains at 6 cents, patrons can buy twenty checks for $1.

Commission's Rate Power Contested.—The question of the right of the Interstate Commerce Commission to direct the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., to charge 3.6 cents a mile on its electric line between Schenectady and Gloversville was raised on a hearing before Public Service Commissioner Frank Irvine of the Second District recently. The commission had previously issued an order requiring the company to show cause why it is charging 3.6 cents. The company filed its answer at the hearing. It alleged that it is a corporation acting as an interstate and intrastate carrier over which the Interstate Commerce Commission has exercised control and that it is subject to Federal legislation regulating interstate traffic. The company is charging the 3.6-cent rate, it says, because it understands that it is compelled to do so by virtue of the mandatory provisions of the Interstate Commerce Commission's order directing the recent 3.6-cent rate generally for intrastate travel. The company says it is willing to conform to the law and desires a final determination and it suggested that for its protection, the Interstate Commerce Commission be made a party to the show-cause order.

Minneapolis Service Improved Greatly.—Report by the city inspector is to the effect that service by the Minneapolis (Minn.) Street Railway has practically reached the 1917 standard, the maximum of the company's history. In December 403,329 passengers were carried and in January, 1921, 401,772 Despite the decline in passengers the improvement in service continued. Inspector Eugene S. Lund's report reads: The average number of revenue passengers carried on weekdays in July 1920, was 370,382, as compared with 401,772 in January, 1921, the report shows. The car miles operated in July were 42,986, as compared with 52,621 in January. The average revenue passengers carried per car mile in July was 8.61, while in January it was reduced to 7.64. The number of cars operated in the late rush period in July was 416, as compared with 558 in January. The trips in the rush hours in July were 749 and in January 1,075 President Horace Lowry said: "Passengers are primarily interested in two factors. They expect a seat in the non rush period and loading that is no excessive in the rush hours. Today we are giving that service. The difference today, compared with the service of 1917, is that we are giving service in the rush hours equal to that of 1917 while in the non-rush hour periods we are using no excessive equipment, bu are giving passengers seats."

Legal Notes

INDIANA — *Automobile Occupant with Knowledge of Intoxicated Condition of Driver Held Contributorily Negligent.*

Where the driver and occupants of an automobile colliding with a train had been drinking intoxicating liquors, a member of the party, who knew of the intoxicated condition of the driver in time before the crossing was reached to have left the automobile and avoided injury, was guilty of contributory negligence. [Kirmse vs. Chicago T. H. & S. E. Railway, 127 Northeastern Rep., 837.]

INDIANA—*Motorist Crossing Tracks Without Looking Held Guilty of Contributory Negligence.*

Where a motorist, knowing that street cars were liable to pass at any time, did not look for cars after he passed a building flush with the corner, and had an opportunity to see down the tracks, he must be deemed guilty of contributory negligence, provided he could have seen the approaching car in time to have stopped his vehicle or avoid the accident. [Union Traction Company of Indiana vs. Moneyhun Company, 127 Northeastern Rep., 443.]

MISSOURI—*Error to Exclude Testimony of Claim Agent that None of Defendant's Employees Knew of an Alleged Assault.*

In an action against a street railway company for an alleged assault by a conductor, the court erred in not permitting the defendant to prove by its claim agent, who investigated the case, that the crews on all cars operated on the line where the assault was alleged to have taken place were examined by the witness, and that none of them knew anything of the alleged occurrence. [Brown vs. United Railways of St. Louis, 222 Southwestern Rep., 890.]

NEBRASKA—*Conductor Need Not Warn Passenger that Car Has Not Stopped, or of Danger in Attempting to Alight.*

Where a street car is reducing speed for the purpose of stopping and discharging a passenger, in response to a signal, it is not the duty of the conductor to warn the passenger, who has proceeded to the rear platform with the apparent purpose of being in readiness to alight, that the car has not stopped, or of danger in attempting to alight, unless there is something in the appearance or conduct of the passenger which should reasonably give the conductor notice that the passenger is to some degree helpless or intends from carelessness to alight while the car is still moving. [McCoy vs. Omaha & C. B. Street Railway, 117 Northwestern Rep., 791.]

NEW YORK—*Negligence of Borrower of Automobile Not Imputable to Owner When Car Was Damaged Through Negligence of Railway Company.*

Where an automobile was lent for use and was damaged through negligence of both the borrower and the company, the owner of the car, on the principle of liability of joint tort-feasors, can nevertheless recover for damage from the street railway company, the negligence of the borrower not being imputed to the owner. [Fischer vs. International Railway, 182 New York, Supp., 313.]

NEW YORK — *Removal of Subway Kiosks at Company's Expense Not Compelled.*

The location by a traction company of subway kiosks on the sidewalks of the street under a certificate issued by the Board of Rapid Transit Railroad Commissioners effected a contract between the city and the company, the consent of local authorities having control of streets being obtained, so that when the street was later widened the city could not compel the company to bear the cost of removing the kiosks from the roadway. [City of New York vs. Hudson & Manhattan Railroad, 128 Northeastern Rep., 152.]

NEW YORK—*New York City Not Authorized to Operate Bus or Stage Lines.*

There is no statutory authority for the operation of bus or stage lines by the city of New York on its streets, and such action is forbidden by the charter, except by grant or franchise. Even if the street car service is in a permanent condition of inadequacy the city cannot undertake such a service under the plea of an "emergency," which is a sudden or unexpected occurrence or condition calling for immediate action. A railway company may enjoin such operation. [Brooklyn City R.R. vs. Whalen, 182 New York Supp., 283.]

NEW YORK—*Public Service Commission Held to Have Jurisdiction to Fix Rates Within City Limits of Railroad.*

Under the Public Service Commissions Law the commission has jurisdiction to authorize a railroad organized under the General Railroad Law of 1850 and using private right-of-way acquired under the present Railroad Law across streets in the city of New York to charge a higher rate of fare within the city limits than that prescribed by an ordinance giving the city's consent to the use of streets, since the fixing of such rates was within police power of the state, and since it had fixed the rate to be charged, the city was precluded from making the charging of a specified rate a condition to its consent to use of streets by the railroad. [People ex rel. N. Y., W. & B. Railway vs. Public Service Commission, First District of New York, et al., 183 New York, Supp., 473.]

NEW YORK—*Passenger Has Burden of Proving Carrier's Negligence When Adjustable Seat Collapsed.*

Despite the doctrine of *res ipsa loquitur,* which may be relied on as raising presumption of negligence, a passenger on a car injured when an adjustable seat collapsed has the burden of establishing negligence, for otherwise the carrier would be an insurer. [Slomka vs. Nassau Electric Railway, 182 New York Supp., 156.]

PENNSYLVANIA—*Husband Not Agent of Wife in Procuring Her Signature to Release.*

That a wife stood silent while her husband bargained with the company's claim agent will not constitute her husband her agent and render her bound by his acts in procuring a settlement and in obtaining her signature to a release, the wife maintaining that the release was obtained by fraud. [Ralston vs. Philadelphia Rapid Transit Company 110 Atlantic Rep., 335.]

SOUTH CAROLINA—*Franchise Held to Obligate Grantee to Build Extensions.*

A street railroad franchise which stated that, in consideration of the construction and operation of the railway within the city and its extension and operation to designated points outside the city, the city remitted all license taxes, provided that until the extensions were made the taxes should not exceed a stated sum, was a contract binding the company to construct the extensions, not merely permitting it to do so. [Thomas vs. Spartansburg Railway, Gas & Electric Company, 103 Southeastern Rep., 149.]

WISCONSIN—*Reasonableness of Rates Depends on Effect on System as a Whole.*

Where a street railway and a suburban railway were operated as one system, the reasonableness of rates fixed by the Railroad Commission as to the operation of the suburban line is not affected by the fact that such line will be operated at a loss under the rates so fixed, the test of reasonableness being the effect upon the system as a whole. [Milwaukee Electric Railway & Light Company vs. Railroad Commission of Wisconsin, 177 Northwestern Rep., 25.]

WISCONSIN—*Stopping of Street Car Not Invitation to Traveler to Cross Street.*

The stopping of a street car at a customary place for discharging and taking on passengers is not an invitation to a traveler in an automobile to cross ahead of it, and if he is so situated that the car can safely start and safely continue, provided he yields the right of way and can safely do so, the car can proceed upon its trip. [Dering vs. Milwaukee Electric Railway & Light Company, 176 Northwestern Rep., 343.]

Personal Mention

C. P. Taft to Resign from Ohio Traction Company

Charles P. Taft, publisher of the Cincinnati (Ohio) *Times Star* and brother of the former president of the United States, William Howard Taft, has submitted to President W. Kelsey Schoepf his resignation as first vice-president and director of the Ohio Traction Company, Cincinnati, Ohio, and as a member of its executive committee. In his letter of resignation Mr. Taft assigns no reason for his action. The resignation will be presented to the board of directors for their consideration at their next meeting.

Mr. Taft recently was instrumental in forming a stockholders' committee of the Cincinnati Street Railway to look after the interests of that company in the developments in the railway situation in Cincinnati. This committee was formed at the time the Cincinnati Traction Company and the Cincinnati Street Railway named special committees of their boards to enter upon negotiations for a revision of the terms of the lease, the franchise and the capitalization of the companies.

It is understood that Mr. Taft will continue to serve as a member of the directorate of the Cincinnati Street Railway. The significance of Mr. Taft's action is that, although he is largely interested in both companies, he will devote his attention and influence to the interests of Cincinnati Street Railway in the pending negotiations.

Airplane Used to Inspect Power Lines

P. H. Chase, chief electrical engineer for the American Railways, and W. R. Power, general manager of the Ohio Valley Electric Railway and the Consolidated Light, Heat & Power Company, have demonstrated that it is possible to inspect high-tension lines by airplane. The test was made in a new Curtis "Oriole," with Bob Shank, a local aviator at Huntington, W. Va., as pilot. The flight was started from Kyle field, the home grounds of the aërial taxi, and continued to Hurricane, in Putnam County, a distance of 25 miles and return.

The line inspected is being constructed by the Virginia Power Company from Cabin Creek, in Kanawha County, to Huntington. The pole lines are now completed to the southeasterly limits of the city and the wire itself has been brought down the valley to a point near Milton.

Mr. Chase and Mr. Power said that they found it entirely possible to make the inspection from the airplane. They said that in the event of trouble a flying inspector could see from the air whether a mishap was due to slide or a break in the wire. This method of getting a bird's-eye view of the line will make it possible to save much time in the location of trouble and thus help to render better service.

J. R. Ong Goes South

Former Transportation Engineer in Winnipeg Takes Similar Position with Georgia Railway

J. R. Ong has accepted a position with the Georgia Railway & Power Company, Atlanta, Ga., as transportation engineer. This opening was created last month by the organization of a new department within the transportation department for the purpose of increasing the efficiency of the transportation service. Mr. Ong reports to the manager of the railway department and works directly with the transportation department in building and fitting schedules for the operation of cars to meet service requirements.

J. R. ONG

The new transportation engineer will carry on a continuous traffic survey over all lines so that the car service furnished to the public can be fitted to the needs of those who use the service. Having arrived at definite information relative to the exact number of passengers to be expected on given lines at given times, Mr. Ong will be in a position to make up schedules which will be for the best interest of the public and company. This will relieve the transportation department of similar work and will leave the transportation department free for the operation of cars to meet the new schedules as outlined.

Mr. Ong was graduated from Purdue University in 1909. His practical railway experience began in the car shops and power plants during the construction and early operating period of the Indianapolis & Cincinnati Tractic Company, Indianapolis, Ind., and th Chicago, Lake Shore & South Ber Railroad, Michigan City, Ind. After was graduated from Purdue he becam an apprentice in the East Pittsburg works of the Westinghouse Compar and was later transferred to the Phil delphia sales office of that company. 1911 he became superintendent of su stations on the Fort Dodge, Des Moin & Southern Railroad, Boone, Iowa.

In December, 1911, Mr. Ong accept the appointment as electric railwa engineer on the joint engineering sta serving the Railroad Commission Wisconsin and the Wisconsin Tax Con mission. In this position he specia ized on transportation matters ar made extended studies for the Rai road Commission relating to operatin matters and service on the electr railways of Wisconsin. After servin with the Wisconsin Commission fo some time he resigned to accept th position of traffic engineer for th Board of Control of the Kansas Cit (Mo.) Railways. In 1918 he resigne that position to become transportatio engineer with the Winnipeg (Man Electric Railway.

Mr. Culkins Resigns

All Cincinnati Agog Over Return Street Railway Director to Commerce Body

Announcement was made on Apr 6 of the resignation of William Culkins as director of street railway at Cincinnati, Ohio, for the city go ernment. At the same time James Reilly, president of the Chamber Commerce, announced that Mr. Culkin would succeed Charles R. Hebble executive secretary of that body. M Hebble has held the position during th past three years.

These changes in themselves cause a considerable stir, but on the heels this news came also intimation of dis sension among committeemen represen ing two sets of stockholders intereste in plans for the reorganization of th Cincinnati Traction Company, operatin in Cincinnati, several traction lines i the state and a construction company It will be recalled that Mr. Culkin several months ago demanded an ac counting in connection with intercom pany charges of $350,000 in accounts in volving the Cincinnati Traction Com pany, the Cincinnati Car Company an the Ohio Traction Company, in transac tions concerning the purchase and sal of materials, certain leases and powe rentals.

This demand for an accounting, M Culkins said, was necessary to deter mine whether or not the Cincinnat Traction Company actually had lost a amount of money sufficiently large dur ing the preceding two months to war rant an increase of fare applied for o March 1, under the service-at-cos franchise.

To bring about a readjustment or re organization of the traction companie there were created at the suggestion of Mr. Culkins two special committees of stockholders, one representing the Cincinnati Street Railway and the other the Ohio Traction Company. This last company controls the operation of the Cincinnati Traction Company.

In a formal statement announcing the change, Mr. Reilly said:

> Mr. Hebble having resigned his position as executive secretary of the Cincinnati Chamber of Commerce, the board of directors authorized the president to tender the position to William C. Culkins, the present director of street railways.
>
> Mr. Culkins expressed reluctance to make a change during the pendency of the street railway reorganization which is being worked out in compliance with his order. However, after a conference with Mayor Galvin and myself, he decided to accept the proposition with the understanding that in compliance with the wishes of the Mayor he would continue in his present position, along with his new duties in the Chamber of Commerce until May 1, by which time it is hoped that the street railway problem will have been substantially solved, and with the further understanding that thereafter he is to place all of his information and services at the disposal of the city in connection with any pending suits or other litigation or questions with the traction company.

The position of executive secretary of the Chamber of Commerce will not be new to Mr. Culkins, for he held the office at the time of his appointment to the office of street railway director by Mayor Galvin.

Mr. Hebble, who has tendered his resignation, succeeded Mr. Culkins as executive secretary in 1917 and has held the office until this time. Other than to say that he had made no plans for the future, Mr. Hebble refused to discuss the affair. He entered the service of the Chamber of Commerce in January, 1914, as manager of the civic and industrial department under Walter Draper, then president of that body, holding that position until he succeeded Mr. Culkins.

Mr. Hebble will continue to fill the duties of the office until such time as Mr. Culkins is ready to succeed him.

Recent Visitor to America in New Work

Gotthard Diedon, who spent several weeks in this country last fall studying electric railway practice, has relinquished his position as managing director of the street railways of Gothenburg, Sweden. He is now director of the harbor of Gothenburg, which, like the railways, is a municipal property, and is one of the most important of Swedish harbors.

A short time ago, Mr. Diedon, in a letter to one of the editors of this paper, said that he regrets that he will not be able to put into practice the experience and new ideas obtained through his studies here. He pays a very high tribute to the personnel of American railways by saying that the industry was fortunate in having managers, engineers, and other officers of such high ability and intelligence, because the standing of the street railways in this country is considered good in view of the extraordinary conditions prevailing for the last few years.

L. A. Downs Heads A. R. E. A.

Vice-President and General Manager Central of Georgia Railway Elected at Annual Convention

Lawrence A. Downs, vice-president and general manager of the Central of Georgia Railway, was elected president of the American Railway Engineering Association at its twenty-second annual convention, held at Chicago on March 15-17. He succeeds A. Stafford as president of the association.

Mr. Downs entered railroad service in February, 1895, with the Vandalia Railroad. From 1896 to 1898 he was in the engineering department of the Illinois Central Railroad, and for nine years following was roadmaster on the Amboy, Louisville, Louisiana, Westfield and Chicago divisions of that road. From 1907 to December, 1910, he was assistant engineer, maintenance of way, of the Illinois Central. In December, 1910, he became division superintendent of the Iowa division and later of the Minnesota and Kentucky divisions.

L. A. DOWNS

In January, 1915, he was made general superintendent of the southern lines and in August, 1916, general superintendent of the northern lines of the Illinois Central. Three years later he became assistant general manager of the road. He was appointed vice-president and general manager of the Central of Georgia Railway in March, 1920.

Mr. Downs was born in Greencastle, Ind., in 1872. He is a graduate of Purdue University in the class of 1894.

E. B. Hardin was appointed auditor of revenue for the Piedmont & Northern Railway, Charlotte, N. C., on April 1. Mr. Hardin will handle all freight and passenger revenue accounts. Mr. Hardin had this position with the company until 1919, when he resigned to engage in other business, at which time this work was placed under the general auditor. His coming back at this time places the auditing work of the company on the same basis as it was previous to 1919.

H. C. Hoagland, formerly vice-president and general manager of the Central Oklahoma Light & Power Company, has resigned to become general manager of the Oklahoma Natural Gas Company. Mr. Hoagland during the last ten years has served at different times as manager of the Muskogee Gas & Electric Company, Muskogee, Okla., and the Fort Smith Light & Traction Company, Fort Smith, Ark., in addition to the position he is now leaving. All these properties are operated by the Byllesby Engineering & Management Corporation, Chicago.

Dr. E. W. Miller has been advanced by the Milwaukee Electric Light & Railway Company, Milwaukee, Wis., to fill the positions of the late Dr. Charles H. Lemon, who for twenty-five years had been chief surgeon of the company and medical director of the Employees' Mutual Benefit Association since its organization nine years ago. Dr. Miller has during the nine years that he has been connected with the company, served both the E. M. B. A. and the company as assistant to Dr. Lemon. So he has been in constant touch with the development of the association and has had much to do with the development of its medical work and other activities. The new medical director is a graduate of the University of Chicago and of Rush Medical College. He had experience in Colorado and the iron country of upper Michigan before going to Milwaukee.

Obituary

Clarence Dallam, formerly solicitor and assistant to the president of the Louisville (Ky.) Railway, is dead. Mr. Dallam was connected with the railway's legal department for about eighteen years. He resigned his position last July. He was a prominent member of the Louisville bar.

T. J. Oliver, one-time owner and operator of the railway system in Dallas, Tex., died recently in McAlester, Okla. Mr. Oliver was for years senior member of the banking firm of Oliver & Griggs, once a leading financial institution of Dallas. Mr. Oliver was eighty-seven years old. He retired from active business many years ago.

Homer J. Hodson, who was in charge of the department of safety and fire inspection of the East St. Louis & Suburban Railway Company, East St. Louis, Ill., died at the St. Joseph's Hospital in Alton, Ill., on March 6 following an operation for appendicitis. Mr. Hodson was thirty-one years old. He was well known by a great many transportation men on account of his activities in the National Safety Council. In the council Mr. Hodson was chairman of the railway section of the bulletin committee. He was also state officer of the American Legion.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,
SALESMAN AND PURCHASING AGENT
ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Good Stocks of Lightning Arresters

Prices Steady Since Reductions of Ten per Cent—Deliveries Are Immediate. but Market Remains Quiet

Sizable stocks of railway lightning arresters are held by producers awaiting the call of car builders for new equipment and railways for replacements. Deliveries are immediate, but as yet the anticipated spring business in this line has not opened up to any great extent. Some producers are optimistic, however, and report that there has been quite an increase in sales recently, though one large manufacturer estimates that demand just now is only 25 per cent of normal. Considerable success has been met in pushing sales of the condenser type of arrester and this is more and more taking the place of old-type equipment, it is stated.

Production has generally been held to low levels as a result of the existing quiet market. In view of the prompt deliveries that can be made producers are inclined to believe that railways are holding off buying until summer and the lightning factor is actually at hand. Ordinarily it would now be growing late for this class of business to be placed. Prices have held steady since general reductions of 10 per cent were made the middle of February.

Lower Prices of Insulating Tapes and Cloth

Stocks Are Held Low Though Immediate Shipments Are Made—Manufacturers Optimistic

Although prices of insulating material in general have for some time been about holding their own, further reductions on a few items have been announced recently. A standard grade of friction tape was reduced in price 6 cents per pound on April 1, a drop of 15 per cent. On the same date all varnished cloths were reduced about 7 to 8 per cent by the same company. On March 28 another manufacturer lowered the price of woven cotton tape, the cut on the 1-in. width being from $1.42 to $1.10 per pound.

The general view expressed by representative manufacturers is that prices in this line can hardly go lower. Cotton, rubber, shellac, etc., are all at unprecedently low figures, and the general average drop on all classes of finished insulating material has amounted to at least 33⅓ per cent, according to the estimate of a well-known manufacturer. Spot cotton at New York is quoted at 12.05 cents per pound at present. Consumers, however, apparently are not yet satisfied that insulation prices have hit bottom as buying remains from hand to mouth for the most part.

Electric railways are making light repairs. Repair shops are buying such material as they need, but their present requirements are small. Manufacturers of finished products such as motors have greatly curtailed production. There is a pretty good industrial market for motor repair work, especially steel mill, at present. These outlets account for a considerable number of orders that are being received, but each order is usually small in size. There is little question that the existing market is quiet and will probably remain so for some time. Distinct optimism is manifest among manufacturers, however, as the expectation of better business persists. There has been, in fact, some slight trend toward improvement already noticed in some quarters in the number of inquiries which were received last month.

Stocks of finished material have been purposely kept rather low by producers, who have materially curtailed production under present market conditions. The supply of finished material, however, is in virtually all cases quite adequate to cover present needs with immediate shipments.

Excellent Deliveries Quoted on Special Trackwork

Producers Are Keeping Rail Stocks Rather Low—Prices Are Somewhat Lower and the Outlook Is for Improvement

Electric railways which may yet be considering coming into the market for special trackwork this spring should meet with excellent delivery conditions. At present there is keen competition for business among producers and with not a large volume of orders on hand deliveries are obtained very promptly. The average time within which manufacturers state that they can fill orders ranges from three to six weeks. For export shipment in some cases and also on some of the more complicated layouts the time in which orders can be filled extends to as much as eight weeks.

In general makers of trackwork who do not roll their own rails report they are keeping stocks of straight rail sections at fairly low levels. In view of the existing quiet market and the considerable tonnage which rail mills would still be able to take on, little difficulty is experienced in replenishing stocks. Frequently, however, especially on girder rails where the tonnage desired is often small, orders are held for a sufficient tonnage to warrant rolling.

Prices quoted on special trackwork are now lower than they were some time ago, but as each order is really an individual job it is impossible to gain a representative idea from producers as to how much prices have declined, though a minimum of 10 per cent would seem at least a very conservative estimate. Open-hearth standard T-rails are still quoted at $47 per ton, but grooved girder rails which on Jan. 5 were quoted in ELECTRIC RAILWAY JOURNAL at $88 per gross ton have undergone some reduction. A nominal quotation at the present time would be $75 to $80 per ton, but a price as low as $67 per ton on an order of 1,000 tons has been made recently.

Producers are generally still optimistic that business in this line will show some improvement later this year, but at the same time there is little hope that the total volume of sales in 1921 will compare very favorably with normal buying years. Steam roads, following reductions in price to $47 per ton by independent producers of standard T-rails, placed a fair amount of orders for special trackwork but have remained inactive since. Electric railways, where money has been available, have entered the market in fair number but in most cases for small repair orders only.

There are certain hopeful signs visible on the horizon, however. The seemingly inevitable ultimate reduction of wages offers an important outlet for lower costs while the need for higher fares is apparently receiving increasing legislative recognition. Steam railroads too have not yet received payment of money due them from the period of federal control and a readjustment of freight rates would very possibly increase business there.

Tenders Asked for Equipment for Railways in South Africa

Tenders are being invited, according to Trade Commissioner Stevenson of Johannesburg, South Africa, for supplying overhead equipment, switches, gears and accessory track equipment for electric railways in South Africa. Specifications covering this equipment are on file with the South African High Commissioner, Trafalgar Square, London, England, copies of which may be obtained at £5 2s. for the first copy and £2 2s. for each additional copy. Bids are to close June 22.

Window Glass Prices Drop About 20 per Cent

roduction Is at Minimum and Stocks Are Not Large—A Resumption of Buying Would Push Deliveries

Effective April 1, the price of window lass has been reduced by manufacturrs between 19 and 21 per cent. The ew discounts announced by the Amercan Window Glass Company, f.o.b. actory with the usual boxing charge xtra, are 82 per cent on single trength, both A and B quality; 83 er cent on double strength, A quality, nd 85 per cent on double strength. B uality. These compare with disounts of 77, 79 and 81 per cent respecively that have all along been quoted s the market. The above new discounts apply to the list prices dated Oct. 15, 1912.

The lowering of producers' prices will ot have the effect on consumer's cost that at first seems evident inasmuch as virtually all jobbers anticipated this decrease some time ago and lowered prices on their own initiative, taking a loss for the sake of moving their stocks.

The present market is extremely quiet, with very little buying from any source, though it is said that the electric railways are ordering for repairs better than are the steam roads this spring. There are several factors in the market, however, that lead glass manufacturers to take an optimistic view of the situation. Probably the chief one is the certainty of an increased demand from the building trade before very long. Another is that there is virtually no large surplus of glass anywhere in the country at present. Some jobbers are still overstocked, but in general their efforts to reduce inventories have been successful, while the policy of glass manufacturers in cutting down production to a minimum has eliminated a surplus on their part.

Production at this time, it may be safely said, is down to about 20 per cent of capacity, or very little above even the present light consumption.

There is considerable cheap Belgian glass on the market, it is true, and in fact low-priced foreign competition has been a very important factor in the slump which the industry in this country has taken. There is, however, little or no supply of foreign glass on the market such as would affect railway requirements.

Labor prices are an important part of the cost of glass manufacture and so far as the hand workers in the industry are concerned there has been no wage cut. As the "hand-operated" factories are all shut down the wage question will probably be reopened again on their resumption of operation in the fall.

Whether wages of machine operators have been reduced or not it has not been possible to learn, but there has been no general cut, at least of the skilled workers.

General Electric's Report Shows Record in Sales

The twenty-ninth annual report of the General Electric Company for the year ended Dec. 31, 1920, shows a record of sales billed never approached by any electric manufacturing company. These billings amounted to $275,758,487, an increase of $45,778,504 over those for 1919. The net value of orders received was $318,470,438 as against $237,623,932 for 1919. At the end of the year the amount of orders unfilled, after eliminating all cancellations, was $111,778,000, compared with $98,880,000 at the close of 1919. Reduction of inventories to market values of Dec. 31, 1920, amounted to $17,803,985.

The unprecedented amount of orders received during the first seven months of the year, plus unfilled orders at the beginning of the year, resulted in more urgent efforts, in a difficult situation, to add to manufacturing facilities, and during the year the company added 2,052,000 square feet of owned factory floor space and 1,768,000 square feet leased with option to purchase. Present manufacturing space amounts to 24,501,000 square feet.

At the close of 1920, inventories at factories amounted to $93,574,114 and at warehouses, in transit, on consignment, etc., amounted to $24,535,059, a total of $118,109,174, as against $83,978,463 at the close of 1919. The following item of customers' accounts and notes receivable, carried at $64,962,682, which is an increase of $19,077,154 over the balance shown at Dec. 31, 1919, is an indication of the way bills are being paid. Total outstanding capital stock at that date was $139,026,900.

Westinghouse Air Brake Has Satisfactory Year

The Westinghouse Air Brake Company, Wilmerding, Pa., under date of April 1, has issued its annual financial statement for the year ended Dec. 31, 1920. The volume of orders received and product shipped during the year, it is stated, was satisfactory. Net profits for the parent organization and all subsidiary companies were $6,580,403, which, after deducting estimated federal taxes and dividends paid out, leaves a surplus of $1,249,122 to be added to the $14,891,457 surplus on hand as of Jan. 1, 1920.

The year 1920 closed with a fair amount of orders on hand, it is stated, but current orders show a marked falling off as compared with previous years. Manufacturing operations of the company thus far this year have been at an almost normal rate, but must be reduced materially unless there is a marked increase in new business. Considering prevailing conditions abroad the operations of the several foreign companies which the Westinghouse Air Brake Company wholly or partially controls were considered very satisfactory.

Inventories, including material, supplies, goods in process and finished stores priced either at cost or market, whichever was lower on Dec. 31, total $15,628,811. The report states that it is hoped that passage of the Winslow bill by Congress will result in payments which will reduce outstanding accounts totaling $13,550,168 to normal proportions.

Tenders on South African Railways Asked

The tenders for the conversion to electric traction of the Cape Town-Simon's Town and the Durban-Maritzburg sections of the South African Railways are due in by May 3. There are seven separate specifications relating to each line. For the first of the lines named these items are: Motor cars and underframes, motor trucks, electric equipment of cars, substation equipment, power house transformers, boilers, boiler house equipment, turbo alternators and condensing plant.

For the Durban-Maritzburg line the specifications are: Electric passenger and freight locomotives, electric yard locomotives, substation equipment, turbo alternators, boilers and boiler house equipment, condensing plant and transformers for substations and power stations.

Rolling Stock

Texas Electric Railway, Dallas, Tex., which owns and operates the street-car system in Corsicana, Tex., has purchased three new one-man cars for service there. With these cars, a fifteen-minute schedule will be maintained on the city lines.

Track and Roadway

Kentucky Traction & Terminal Company, Lexington, Ky.—Chief Engineer McLeod has informed the Commissioner of Public Works that the Kentucky Traction & Terminal Company will begin work as soon as the weather permits on track repairs.

Detroit (Mich.) Municipal Street Railway.—F. M. Meyer, city purchasing agent of Detroit, is in Spokane inspecting poles and arranging for a contract award for 3,000 poles, 35, 36 and 40 ft. long. The purchase calls for an expenditure of about $65,000.

Trenton, N. J.—The Trenton (N. J.) City Commission has instructed the Trenton & Mercer County Traction Corporation, the New Jersey & Pennsylvania Traction Company and the Public Service Railway to improve the paving on streets in Trenton where their lines run.

Oklahoma Railway, Oklahoma City, Oka.—The Oklahoma Railway is making track improvements in the downtown section of the city which will cost approximately $4,000.

Memphis (Tenn.) Street Railway.—The Memphis Street Railway expects to have to reconstruct about 2,200 ft. of double track and 2,000 ft. of single track on North Second Street. This is now T-rail and will be replaced with girder rail. The reconstruction will be necessary to meet the city's plan of repaving the street, using asphalt.

Memphis (Tenn.) Street Railway.—Track improvement, which will provide for the rerouting plans contemplated by the Memphis Street Railway, will be started about April 15. Commissioner Johnson has stated that the work was waiting for the delivery of curves, switches, etc.

Dallas (Tex.) Railway.—The Dallas Railway will begin work on the extension of its line on Fairmount Street, that will reach the Parkland City Hospital, near the middle of April, according to announcement by Richard Meriwether, vice-president and general manager. The line will extend out Fairmount Street to Oaklawn Avenue within one block of the city hospital. Work has been held up on account of bridge work on Turtle Creek. It is expected that the line will be completed within five months. This is one of the extensions for which the Dallas Railway is committed under the terms of its charter.

Indiana Service Corporation, Fort Wayne, Ind.—The Indiana Service Corporation has agreed with the International Harvester Company to extend the line to the company's big new truck plant east of the city as soon as the plant is completed.

Power Houses, Shops and Buildings

Southern Public Utilities Company, Charlotte, N. C.—The Southern Public Utilities Company has rebuilt its Second Street, Winston-Salem electric power station and has equipped it with modern transformers. Already $150,000 has been spent and many thousands more will be expended in completing the reconstruction and redistribution improvements.

Mobile Light & Railroad Company, Mobile, Ala.—The Mobile Light & Railroad Company has under contract with the Westinghouse Electric & Manufacturing Company a 1,000-kw. turbine and 550-600-volt generator with condenser. The company has completed a steel and concrete carhouse 100 ft. x 200 ft. having eight inspection pits together with a large amount of yard storage. An office for the transportation department has also been completed.

Salt Lake & Utah Railroad, Salt Lake City, Utah.—A new power substation will be constructed at Curtis, Utah, on the Salt Lake & Utah Railroad this summer, at a cost of $50,000. Curtis is 5 miles north of Provo, on the main line of the road, and this will be the fifth substation on the line between Salt Lake and Payson, the other four being at Granger, Bringhurst, Lindon and Springville. The new power substation is expected to be completed by September.

Trade Notes

The Standard Paint Company, 95 Madison Avenue, New York City, manufacturer of weatherproofing products, announces a change in its corporate name to the Ruberoid Company.

E. I. Du Pont de Nemours & Company, Inc., is putting out uniform caps made of pyroxylin coated goods (leather substitute) which is waterproof and made in colors to match the uniform.

The Conveyors Corporation of America, Chicago, announces the appointment of Robert B. M. Wilson as sales engineer of the Chicago district, with E. M. Wolfe associated with him as an assistant.

The Universal Crane Company announces the removal of its plant from Cleveland to its new factory at Elyria, Ohio. The company has greatly increased its capacity and production is now under way in the new plant.

Daniel J. P. Jones, formerly connected with the Chicago office of the Economy Fuse & Manufacturing Company, has been appointed sales representative of the company in Michigan and will have his headquarters in Grand Rapids.

E. G. Le Laurin has resigned as Southern sales representative of the Southern Supply & Hardware Company, St. Louis, to become associated with W. D. Jenkins, representative for railway equipment and supplies, Dallas, Tex., looking after the Dallas-Houston-New Orleans territory.

The Hopewell Insulation & Manufacturing Company, Hopewell, Va., announces that it is now represented in Chicago by the Midstates Engineering Company, Westminister Building, which company takes in the district of Ohio, Indiana, Illinois, Michigan, Missouri and Wisconsin.

The Barney & Smith Car Company, Dayton, Ohio, will not be funded under the plan described in the March 19 issue for financing the working capital requirements of the company by an issue of $2,000,000 second mortgage, 7 per cent bonds. An insufficient amount of subscriptions were received and other measures will have to be devised for the continuance of the company's business. Directors of the company will meet next week to consider further steps toward clearing up the company's finances.

The Under-Feed Stoker Company of America, Book Building, Detroit, has placed its Western selling agency with the Merkle Machinery Company, of Kansas City. The selling agency has branches in Omaha, Neb., and Tulsa, Okla., selling, designing and installing machinery for power and pumping plants. The Salt Lake City agency has been placed with N. L. Alison, 616 Newhouse Building. The company also will be represented in the Southern territory through Smith & Whitney, Southwestern Life Building, Dallas, Tex.

A. J. Manson has been appointe manager of the Railway Division, Ne York office of the Westinghouse Ele tric & Manufacturing Company. Aft graduating from Massachusetts Inst tute of Technology in 1905 Mr. Manso entered the company's engineering a prenticeship course. He was active in t electrification of the New Haven Rai road and the Pennsylvania Railroad in New York City and during the past fe years has been connected with the sal organization in New York.

Engineering Business Exchange, Ne York, announces the opening of a Sout eastern branch with Marshall O. Leig ton, consulting engineer, of Washing ton, D. C., as director. Mr. Leighto was for a dozen years one of th principal officers of the United State Geological Survey. During the pa three years he has been chairman the National Service Committee of th Engineering Council. Associated wit Mr. Leighton in carrying on the E change will be A. C. Oliphant. Th Southeastern branch of the Enginee ing Business Exchange has offices the McLachlen Building, Washingto D. C.

New Advertising Literature

Seats.—The J. G. Brill Compan Philadelphia, Pa., has issued leaflet N 248, describing "Brill Seats for Motor men and Conductors."

Rails.—The Titanium Alloy Manufac turing Company, Niagara Falls, N. Y has issued bulletin No. 9 in its serie of reports on open-hearth rails.

Pulverized Coal.—The Fuller-Lehig Company, Fullerton, Pa., is distributin bulletin No. 600, entitled "Pulverize Coal for Boilers."

Brush Holders.—D. B. Flower, 121 Spring Garden Street, Philadelphia, i distributing two leaflets covering dif ferent types of Flower brush holder for industrial motors.

Metal Statistics. — The fourteent annual edition of the Metal Statistics 1921, has been published by the American Metal Market and Daily Iron and Steel Report, 81 Fulton Street, New York City.

Damper Regulator.—A new hydraulically operated damper regulator for boiler pressure up to 250 lb. has recently been developed by the Atlas Valve Company, 282 South Street, Newark, N. J.

Electric Locomotives.—Westinghouse Electric & Manufacturing Company has issued a pamphlet on the electrification of the N. Y., N. H. & H. R. R., with especial reference to the road's six latest electric locomotives which are described.

Transmission Towers. — Archbold-Brady Company, Syracuse, N. Y., has published a booklet illustrating and describing the transmission lines of the Niagara Falls Power Company constructed by it, which involved some special engineering problems.

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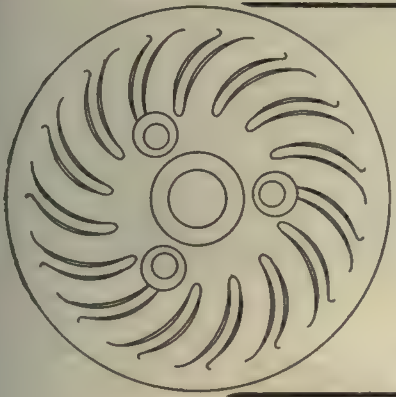

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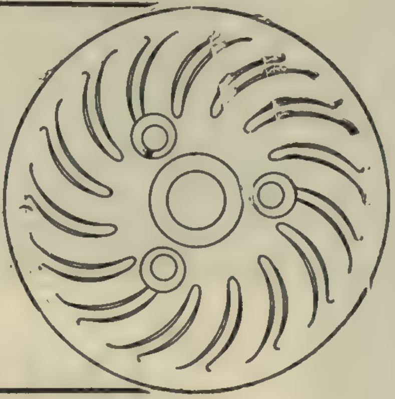

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The Most Successful Men in the Electric Railway Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week

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Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
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When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

Deflate Your Costs

Cost of electric railway operation is too high and must come down.

Accident costs are enormous. Careless handling of equipment eats into earnings. Power losses dissipate dividends. Repair of equipment is excessive. Other losses of great proportions are increasing the deficit, and a fruitful source of revenue is overlooked in the failure of your employees to sell your service to the traveling public.

The most important cause of these vital losses is the destructive viewpoint that has been instilled in the mind of the human element, which has totally destroyed the morale and co-operative spirit which formerly predominated. The reduction of your costs will follow to the extent that the viewpoint of your human element is reconstructed.

Sherman Service is educating employees on electric railways, reconstructing viewpoints to a sound understanding of the need of co-operating to bring down costs by stopping these losses.

Our representative will gladly call upon request and explain how your results can be improved by applying our constructive service.

SHERMAN SERVICE INC.

Production Engineering Industrial Co-ordination

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2 Rector St.

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314 No. Broadway

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Toronto
10 Adelaide St., East

Pittsburgh
401 Wood St.

Kansas City
Reliance Building

Montreal
Drummond Building

Largest organization of its kind in the world. Founded April 7, 1910

SHERMAN SERVICE

Copyright, 1920, Sherman Service, Inc.

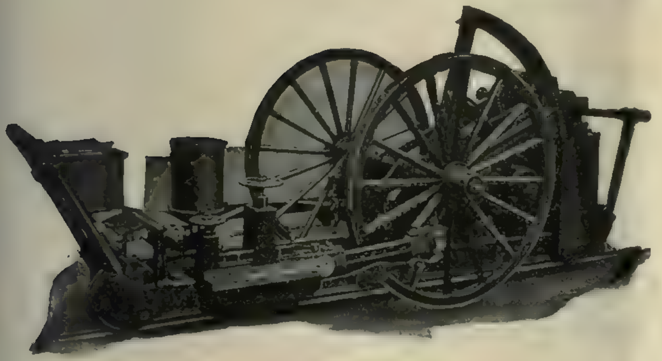
Double Ended Candle Burning Never Symbolized Economy

Neither does the practice of letting car wheels and cupped joints pound the life out of track and rolling stock.

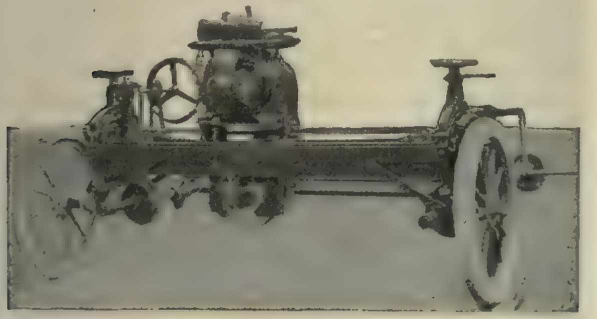
That's worse than burning a candle at both ends because it costs more.

Only a tremendously profitable electric railway can afford to operate on poor track, or to do nothing when track is dangerously near the rehabilitation stage.

Even a road sorely pressed for funds can afford to restore its worn track by the use of efficient rail grinders.



The Reciprocating Track Grinder is for removing rail corrugations and grinding slightly cupped joints.



The Universal Rotary Track Grinder and the Atlas Rail Grinder should be used for removing surplus metal after welding.

We shall be pleased to tell you how the different track grinding problems have been solved.

RAILWAY TRACK-WORK CO.
3132-48 East Thompson St., Philadelphia, Pa.

THE BABCOCK & WILCOX COMPANY
STEAM

THE BABCOCK & WILCOX CO.
85 LIBERTY ST., NEW YORK

The Babcock & Wilcox Co. is constantly endeavoring to improve the design, construction and operating qualities of its products. The Company believes in being conservative and in refraining from making changes until absolutely satisfied that its developments are sound from engineering, construction and operating viewpoints.

THE STIRLING BOILER
REDESIGNED, RECLASSIFIED, PATENTED

During the last fifteen years numerous changes have been made in the Stirling Boiler. In some instances these have been to meet special and unusual operating conditions, and others have been the result of improvements in details of design and construction. These changes have been carefully watched and proven under various and difficult conditions of operation. The advantages of many of them in service have been so marked that after years of experience and study these features have been incorporated in the redesigned Stirling Boiler.

The studies which have led to redesign have also led to a consideration of the variation between classes and sizes of Stirling Boilers. This has resulted in a reclassification of these boilers in which the variation between classes and sizes is simple, logical and progressive.

The redesigned and reclassified Stirling Boiler is now offered.

BRANCH OFFICES

Boston, 49 Federal Street
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Pittsburgh, Farmers Deposit Bank Building
Cleveland, Guardian Building
Chicago, Marquette Building
Detroit, Ford Building
Cincinnati, Traction Building
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Salt Lake City, 705-6 Kearns Building
San Francisco, Sheldon Building
Los Angeles, 404-406 Central Building
Seattle, L. C. Smith Building
Havana, Cuba, Calle de Aguiar 104
Houston, Texas, Southern Pacific Building
San Juan, Porto Rico, Royal Bank Building
Honolulu, H. I., Castle & Cooke Building

Rusta

In the cities and villages of Shantung, China, and even in the adjacent provinces, it is believed most unlucky to live in a house which faces a turn in the *rusta* (road).

Such a house can be protected against evil, however, if the householder journeys to Tai Shan and brings back with him a small pebble. This he inserts in the front wall of the house and letters this inscription over it, *"A stone from Tai Shan. Who dares come this way!"* For all stones from Tai Shan are supposed to be talismans which guard against evil spirits.

Many operators face "a turn in the road" today. Brush trouble has become intolerable. They realize something must be done but are not quite sure of how to go about it.

For them—here is a "stone from Tai Shan": *Send for a Morganite Prescriber.* He will fit a type of brush to your operating conditions which will guarantee smooth running.

Try it at our risk!

Morganite Brush Co., Inc.

Main Office and Factory: 519 West 38th Street, New York

DISTRICT ENGINEERS AND AGENTS:

Electric Power Equipment Corp., 13th and Wood Sts., Philadelphia
Electrical Engineering & Mfg. Co., First National Bank Bldg., Pittsburgh
R. W. Lillie Corporation, 176 Federal St., Boston, Mass.
W. R. Hendrey Co., Hoge Bldg., Seattle
Herzog Electric & Engineering Co., 150 Steuart St., San Francisco
Charles Farnham, I. W. Hellman Bldg., Los Angeles
Railway & Power Engineering Corporation, Ltd., 131 Eastern Ave., Toronto, Ontario, Canada

Texaco Lubricants for the Electric Street Railways

A suggestive list showing a number of places in which the Texaco Lubricants designated have met with marked success.

This list will be a handy reference and we urge you to clip it and keep it in an easily obtainable place.

ROLLING STOCK

For journal boxes, armature and axle bearings.	TEXACO Electric Car Oil, Summer and Winter.
For safety car ball bearings.	TEXACO Grease No. 00.
For grease type motor bearings.	TEXACO Liquid Electric Motor Grease.
For air compressors.	TEXACO Electric Compressor Oils.
For gears and pinions.	TEXACO Crater Compound Nos. 1, 2 and 5.
For motorman's valves and controller fingers.	TEXACO No. 921 Transmission Lubricant.

TRACK DEPT.

For curves.	TEXACO Curve Oil, Summer and Winter. TEXACO Graphite Curve Grease.

SHOPS

For general machine lubrication.	TEXACO Nabob Oil.
For lubricating cutting tools.	TEXACO Cutting Oils.
For cooling cutting tools.	TEXACO Soluble Oil.
For gears of machine tools.	TEXACO Crater Compound Nos. 1, 2 and 5.

POWER HOUSES

For Direct Connected turbines and generators.	TEXACO Regal Oil.
Reduction Geared Turbines.	TEXACO Alcaid or Algol Oil.
For hand feed and circulating oiling systems of steam engines. For sub-station equipment.	TEXACO Engine Oils.
For steam cylinders.	TEXACO Cylinder Oils.
For compression grease cups.	TEXACO Greases Nos. 00, 1, 3 and 5.

The correct grade to meet your conditions will be selected after an examination by our Lubrication Engineers.

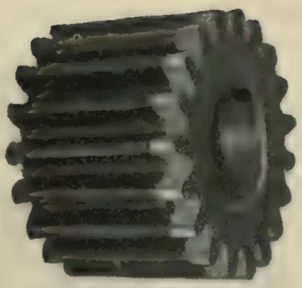
MISCELLANEOUS: TEXACO Burning Oils, TEXACO Electric Signal Oil, TEXACO No. 300 Oil

If the grade of oil to use for any specific machine or part is not covered in the above list, kindly call on us and we shall be glad to tell you which is the right oil for the right place.

There is a Texaco Lubricant for Every Purpose

THE TEXAS COMPANY
DEPT. S.T. 17 BATTERY PLACE NEW YORK CITY
HOUSTON - CHICAGO - NEW YORK
OFFICES IN PRINCIPAL CITIES

Tool Steel" Quality T. S. Q. "Tool Steel" Quality

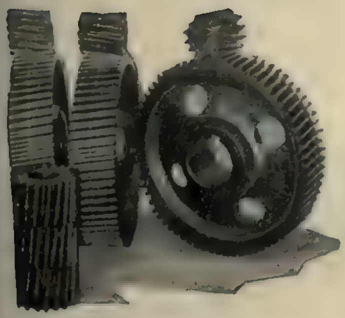


White paint illustrates softened end of teeth on motor side of pinion. This eliminates chipping. (Patent pending)

"Tool Steel"

HELICALS

are just as superior
in quality as
"Tool Steel"
SPURS.



"Tool Steel" Helical gears—in sets, or interchangeable with other makes.

"Tool Steel" Quality T. S. Q. "Tool Steel" Quality

The strain was too much for *this* hea

The life of a brakeshoe head isn't an easy one. Plenty of rack and bang to make things miserable.

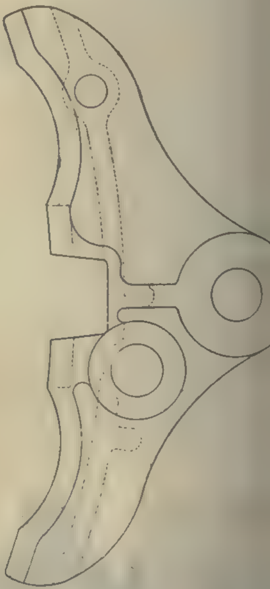
Ordinary heads are short lived at best, but when they happen to have a flaw they're liable to go to pieces any time.

But like all other Boyerized products, the Manganese Stag Brand Heads turned out by us are made to take the *worst,* and to take it without showing punishment for a long, long time—at least four times as long as the ordinary kind.

And during all that time you have that blessed feeling of *safety* as well as of economy.

Boyerized Brake Pins and Bushings are the widest known examples of our long-life, safe-life equipment, but we also solicit your inquiries for the entire line of

Stag Brand Manganese Specialties



Brake Hangers
Brake Fulcrums
Brake Levers
Spring Post Bushings
Side Bearings
Center Bearings
Spring Posts
Bolster and Transom Chafing Plates
Pedestal Gibs

"So tough they cannot be drilled, and still pliable enough to bend without breaking."

Bemis Car Truck Company

Electric Railway Supplies
Springfield, Mass.

Nuttall

The Latest Nuttall Development in Railroad Motor Pinions

The R. D. Nuttall Company has recently completed a special process of drop-forging motor-pinion blanks

Pinion blanks made by this new process are homogeneous, close-grained, free from forging flow lines, and possess practically the same longitudinal and transverse strengths.

The real significance of this new development in the basic material, is the production of motor pinions with greater tooth strength in the direction of the loading—that is, transverse or at right angle to the axis.

Below is given data showing the ratios of ductility (taken from transverse and longitudinal tests of normal medium carbon, untreated material) of those types of blanks commonly used (Figs. 1 and 2), and of the Nuttall Special Drop-Forged Blank, (Fig. 3).

Blank Cut from Rolled Steel Bar

	Elongation in 2 inches	Ratio of the elongation of the longitudinal to the transverse
Longitudinal	17.50%	
Transverse	7.50%	42.8%

Blank Made of Upset Forging

	Elongation in 2 inches	Ratio of the elongation of the longitudinal to the transverse
Longitudinal	25.00%	
Transverse	15.50%	62.0%

Blank Made of Nuttall Special Drop Forging

	Elongation in 2 inches	Ratio of the elongation of the longitudinal to the transverse
Longitudinal	27.30%	
Transverse	26.60%	97.4%

Look for our advertisement on Nuttall Special Drop-Forged Pinion Blanks in the next issue of Electric Railway Journal

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

"STANDARD"

Steel Tires
Steel Tired Wheels
Solid Rolled Steel Wheels
O. H. Steel and Malleable Iron Castings
Solid Forged Gear Blanks
Steel Forgings Iron Forgings
Forged and Rolled Steel
Pipe Flanges
Ring Dies
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"The 'Standard' Brand on your material is an assurance of eventual economy."

STANDARD STEEL WORKS CO.

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The Great and Particular Value of

CYPRESS

S C M A
Trade Mark Reg. U.S. Pat. Office

"THE WOOD ETERNAL"

is its **high resistance to decay.** (Specify "All-heart **Tidewater** Cypress"—every piece identified by the above trade-mark as the product of a responsible *Licensed* Assn. Mill.)

The Railway Signal Association has always placed all-heart Cypress among the first choices in the list of suitable woods for

Trunking and Capping

The Railway Signal Association makes its recommendations as a result of definite **knowledge,** and its membership includes many able men who are Cypress enthusiasts. We gladly refer any doubter as to Cypress superiority to any well posted engineer who has had experience with "The Wood Eternal."

The same service conditions which make Cypress superior for "Trunking and Capping" are present in many other railway lumber requirements, such as

Fencing

and similar purposes where the material is exposed constantly to the weather and **high resistance to decay is essential.**

If railway men in general will study the question of wood durability for other uses as carefully as Railway Signal men have studied it there will be a lot more all-heart Cypress used in railway service—**to the very great economy of the companies using it.**

Our data is at your service.

WILL YOU WRITE US? WE WILL REPLY FRANKLY.

Southern Cypress Mfrs.' Assn.

1265 Perdido Building
New Orleans, La.
or
1265 Heard National Bank Building
Jacksonville, Fla.

Bates Pole Prices Reduced

Reflecting the spirit of the times and realizing the necessity of returning to normal conditions as rapidly as possible, the prices of Bates One-Piece Steel Poles have been reduced. The new prices became effective April 1st, 1921, and will apply on all quotations and proposals now outstanding.

It is our desire to boost the expansion of the Central Stations and Electric Railways in the most substantial manner possible by this reduction. It is our hope that this action will encourage and revive plans for lines that are now dormant.

Readjustment must come. The time is here and now—even though it means a sacrifice—and we are glad to assure the pole users of the world that we expect to do our share.

Write for our new price schedule and our 1921 Steel Pole Treatise and plan for permanent construction with Bates One-Piece Steel Poles.

Bates Expanded Steel Truss Co. 208 S. La Salle St., CHICAGO, ILL.

New mate welded into place by the Thermit Insert Method. No more electrolysis troubles!

Thermit Insert Welding

The life saver of your track, never more indispensable than at the present time when maintenance costs must be reduced to an absolute minimum.

The only practical fully welded joint on the market. By means of the Thermit Insert Weld a perfectly continuous rail is secured with the joint fully as strong as the rail itself. Does away with maintenance costs involved in frequent renewals of mechanical joints and of fish plates or splice bars when welded to the rail.

Send for Pamphlet 3932.

METAL & THERMIT CORPORATION

SERVICE STRENGTH THERMIT WELDING ECONOMY

Boston
Chicago
Pittsburgh

120 Broadway New York

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San Francisco

Type R-5

Manufacturers of Single and Double fare registers, counters, car fittings. Exclusive selling agents for HEEREN ENAMEL BADGES.

New Safeties in Kokomo, Ind.
are
International Equipped, of Course

Real Service in Kokomo has made the new equipment popular with the passengers.

One of the important items in this service is the International Register on each of the new cars.

On new or old equipment, and under all conditions of service, International Registers are accepted as practically standard for effective, economical registration.

The collection system, based on these registers is flexible, accurate, and the easiest for platform men to operate.

The INTERNATIONAL REGISTER CO.
15 South Throop St., Chicago

"ACMES"
(Nestable) Culvert
near Bryan, Ohio

Still in fine condition
after 12 years

"ACME" (NESTABLE)
TONCAN
CORRUGATED METAL CULVERTS

Installed in 1909, this 72-inch "ACME" (Nestable) Culvert is still on the job,—in fine condition,—good for years to come. Everywhere, under railroads and highways "ACMES" are giving such long service. Made of Toncan Metal, they endure! Write for delivered prices.

THE CANTON CULVERT & SILO CO.
MANUFACTURERS
CANTON, OHIO, U.S.A.

They are uniform in quality

They talk for themselves

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227 Fulton Street
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Rail Bonds

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TWIN TERMINAL
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Send for new
Rail Bond book

American Steel & Wire
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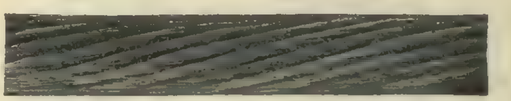

665 Wires, each No. 30 B. & S. Gauge; Diameter $\frac{11}{32}$"
Circular Mils 66832 Code Word: DESIRE

SHOE SHUNT CABLE

Especially Designed for Third Rail Electric Roads

259 Wires, each No. 24 B. & S. Gauge; Diameter $\frac{27}{64}$"
Circular Mils 104636 Code Word: DESCENT

Samples and Prices to Any Interested
Electric Railroad Upon Request

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2300 South Western Avenue
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Eastern Office and Warehouse: METUCHEN, N. J.

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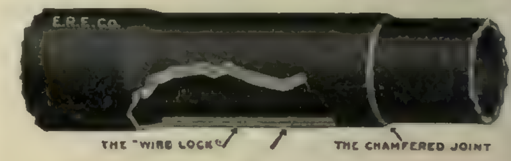
BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

Reg. U. S. Pat. Office
Galvanized Iron and Steel Wire and Strand
Incandescent Lamp Cord

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 233 B'way; San Francisco, 612 Howard; Seattle, 100 1st Ave. So.

ELRECO TUBULAR POLES



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Lowest Cost **Lightest Weight**
Least Maintenance **Greatest Adaptability**

Catalog complete with engineering data sent on request.

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New York City, 30 Church Street

AETNA INSULATION LINE MATERIAL

Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches.

Albert & J. M. Anderson Mfg. Co.
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Copper Wire
111 W. Washington St., Chicago

"NATIONAL"

TUBULAR STEEL POLES
The Recognized Standard
For Electric Railway Purposes
Ask for "NATIONAL" Bulletin No. 14
NATIONAL TUBE COMPANY, PITTSBURGH, PA.

Wire Rope and Wire
Electrical WIRES and CABLES

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BENNETT-FIELD CROSS TIE CO.

FISHER BLDG., CHICAGO
"The Shippin' Fools"
RAILROAD TIES, SWITCH TIES and CROSSING PLANK

LUMBER

TIES—TIMBERS—POLES—PILING
DUNCAN LUMBER COMPANY, Portland, Oregon

Specialists
in
Street
Railway
Requirements
Write for List

STANDARD Wires and Cables
Unexcelled in quality
Dependable in service
Economical in price
Prompt shipments
Standard Underground Cable Co.
Pittsburgh, Pa.
Branches in all principal cities.

High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE CONSTRUCTION

New York Switch & Crossing Co.
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U. S. Electric Contact Signals
for
Single-track block-signal protection
Double-track spacing and clearance signals
Protection at intersections with wyes
Proceed signals in street reconstruction work
United States Electric Signal Co.
West Newton, Mass.

OPPER CLAD STEEL COMPANY
OFFICE AND WORKS. N. PA BRADDOCK P. O.
WESTERN SALES REPRESENTATIVES: STEEL SALES CORPORATION, CHICAGO, ILL.
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OPPERWELD Wire—a non-corroding electrical conductor 8% Lighter—50% Stronger than Copper.

Peirce Forged Steel Pins with Drawn Separable Thimbles
Your best insurance against insulator breakage
Hubbard & Company
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ransmission Line and Special Crossing Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
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Lackawanna
Deseamed Rails
Splice Bars and Patent Joints
Track Bolts and Spikes
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Send for booklets, "Lackawanna Deseamed Rails," "Improved Track Appliances," "Track Bolts and Spikes."

Lackawanna Steel Company
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SPECIAL TRACKWORK
Of the well-known **WHARTON** Superior Designs and Constructions

STEEL CASTINGS CONVERTER AND ELECTRIC
FORGINGS DROP, HAMMER AND PRESS
GAS CYLINDERS SEAMLESS STEEL

WM. WHARTON JR. & CO., Inc., Easton, Pa.
(Subsidiary of Taylor-Wharton Iron & Steel Co., High Bridge, N. J.)
ORIGINATORS OF
MANGANESE STEEL IN TRACKWORK

AUTOMATIC SIGNALS
for Electric Railways
Highway Crossing Bells
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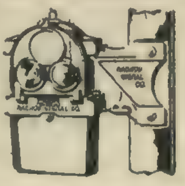
NACHOD SIGNAL CO.

Better High Tension Insulators
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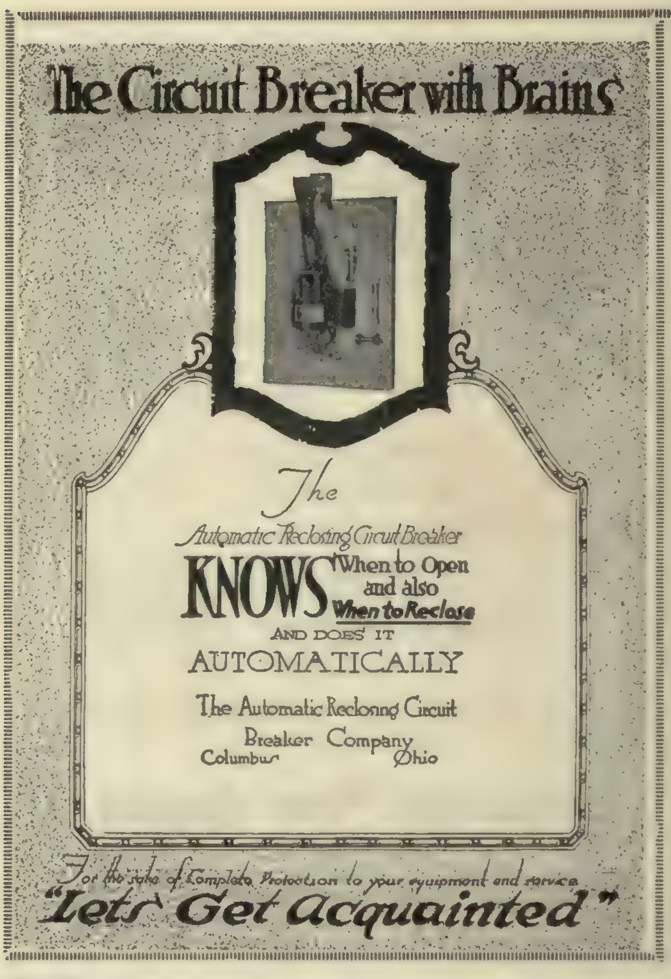

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The Automatic Reclosing Circuit Breaker
KNOWS When to Open and also When to Reclose
AND DOES IT
AUTOMATICALLY

The Automatic Reclosing Circuit Breaker Company
Columbus Ohio

For the sake of Complete Protection to your equipment and service
"Let's Get Acquainted"

SPECIALISTS
in the
Design and Manufacture
of
Standard—Insulated—and Compromise Rail Joints

The Rail Joint Company
61 Broadway, New York City

BARBOUR-STOCKWELL CO.
205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of
Special Work for Street Railways
Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossing

ESTIMATES PROMPTLY FURNISHED

WE-FU-GO AND SCAIFE
WATER PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES
WM. B. SCAIFE & SONS CO. PITTSBURGH, PA.

Nelsonville Filler and Stretcher Brick for T Rails

Makes permanent, light, level pavement with a minimum of paving repairs.

The Nelsonville Brick Co.
Columbus, Ohio

THE CUTTER ELECTRICAL AND MANUFACTURING CO.
CIRCUIT I-T-E BREAKERS
PHILADELPHIA

I. T. E.
Circuit Breakers

for heavy street railway work are the best obtainable. Write for New Complete Catalogue.

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Automatic Safety and Automatic Return Switch Stands for Pas
ing Sidings. Tee Rail Special Work for Interurban Lines ar
Private Rights of Way. Manganese Construction a Specialt

Ramapo Iron Work
HILLBURN, NEW YORK
Plants at Hillburn, N.Y. and Niagara Falls, N.Y. New York Office, 30 Church

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THE TERRY TURBINE
For Driving Your Auxiliaries
TERRY STEAM TURBINE CO.
Hartford, Conn

BAKELITE-DILECTO
The fields of usefulness for Bakelite-Dilecto are many and varied becaus
its superior merit over materials heretofore available in sheets, tubes or
The exceptional qualities of Bakelite-Dilecto are satisfying electric rail
all over the country. Investigate.
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FOSTER SUPERHEATERS
A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits
Power Specialty Company Boston Chicago Philadelphia San Francisco Pittsburgh London, Eng. **111 Broadway, New Yo**

NILES-BEMENT-POND CO.
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MACHINE TOOLS
FOR ELECTRIC RAILWAYS

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- Boring Mills
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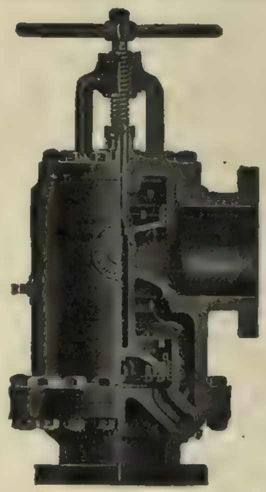
- Cranes
- General Machine Tools



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These valves have the qualities of our Automatic Stop Check Valves together with emergency features, whereby the valves may, in the event of a break in the steam line beyond the boilers, be instantly closed from a distance, by relieving the pressure under an enlarged piston "O" in cylinder "N."

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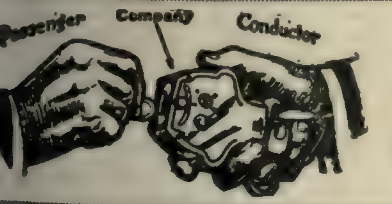

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CAR-BARN foreman wanted for property located in Central West. Eighty cars, one-half Birney type. Must be competent to supervise maintenance standard and safety car equipment. P-872, Elec. Ry. Journal, Old Colony Bldg., Chicago.

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CAR-BARN man wanted: Permanent seashore position. We want a man who can locate electrical troubles and keep cars in good operating condition, less than 20 cars out during summer and two during winter; plenty help in summer, easy in winter. Salary $130 to $140 per month. Position open right now. Give references and state wages you will come for. P-875, Elec. Ry. Journal.

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AMUSEMENT park manager at liberty will operate park for owners on salary and commission basis, or will lease park outright upon terms mutually satisfactory. Many years' experience. electric railway references. Address, Park Manager, Room 403, 1511 Arch Street, Philadelphia, Pa.

ELECTRICAL engineer, technical graduate; four years' experience in testing and railway engineering departments of large electrical manufacturer. Position wanted with electic railway company where duties will concern electrical equipment of both power house and rolling stock; age 29; minimum salary $250 per month; available after 30 days' notice to present employer. PW-873, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

EXPERIENCED outside construction man desires position in way of electric railway, lighting, underground and submarine cables. Most experience in city of 200,000 population. Can produce results. PW-828, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

MANAGER or superintendent. Age 37, height 5 ft. 8 in.; seventeen years' experience in all branches of tramway work with one up-to-date corporation, as conductor, motorman, inspector, and motor inspector. As motor inspector I was responsible for the motormen and their efficiency, power economy, rolling stock, etc. In two years I reduced the power bill by £4,000 ($20,000) per year; increased the wheel tire mileage 15,000 miles; brake blocks 12,000 miles; reduced accidents and insurance premium; power consumption for B. T. H. four motored cars, was the lowest in the British Isles; almost the lowest any make of tramcar. Competent to take charge of maintenance; overhead and permanent way departments; office routine as correspondence, costing, filing, legal procedures, returns and analysis. Conversant with the revenue side and alert to stop "leakages"; I have organized working and bonus systems approved of by the highest authorities on tramways and trade unionism. Capable of dealing with labor troubles. My present post in the tropics gives me experience with a colored public and labor. Further particulars, copies of references, and photograph if required. PW-871, Elec. Ry. Journal.

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SUPERINTENDENT of small road with seven years' experience in the maintenance of equipment; excellent references. PW-868, Elec. Ry. Journal.

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LEGAL NOTICE

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of Electric Railway Journal, published weekly at New York, N. Y., for April 1, 1921.

State of New York }
County of New York } ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared James H. McGraw, Jr., who, having been duly sworn according to law, deposes and says that he is the Secretary of the McGraw-Hill Co., Inc., Publishers of Electric Railway Journal, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are: Publisher, McGraw-Hill Co., Inc., 10th Ave. at 36th St., New York, N. Y. Editors, Henry W. Blake and Harold V. Bozell, 10th Ave. at 36th St., New York, N. Y. Managing Editor, Henry W. Norris, 10th Ave. at 36th St., New York, N. Y. Business manager, L. W. Seeligsberg, 10th Ave. at 36th St., New York, N. Y.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) McGraw-Hill Co., Inc., 10th Ave. at 36th St., New York, N. Y. James H. McGraw, 10th Ave. at 36th St., New York, N. Y. Arthur J. Baldwin, 10th Ave. at 36th St., New York, N. Y. Fred Low, 10th Ave. at 36th St., New York, N. Y. Henry Blake, 10th Ave. at 36th St., New York, N. Y. Leonard Baldwin, 27 Pine St., New York, N. Y. F. S. Weatherby, 163 Clinton Road, Brookine, Mass. Arthur J. Baldwin, Trustee for Estate of John A. Hill, 10th Ave. at 36th St., New York, N. Y. Arthur J. Baldwin, Trustee for Donald Baldwin, 10th Ave. at 36th St., New York, N. Y. Arthur J. Baldwin, Trustee for Franklin Baldwin, Grace Baldwin and Cynthia Haselton, 10th Ave. at 36th St.,
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3. That the known bondholders,
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or holding 1 per cent or more of
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ities are: (If there are none, so state.)

4. That the two paragraphs next a
giving the names of the owners,
holders, and security holders, if any,
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security holders as they appear upor
books of the company but also, in
where the stockholder or security h
appears upon the books of the compar
trustee or in any other fiduciary rela
the name of the person or corporatio
whom such trustee is acting, is given
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and belief as to the circumstances and
ditions under which stockholders an
curity holders who do not appear upo
books of the company as trustees,
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than that of a bona fide owner; and
affiant has no reason to believe that
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JAMES H. MCGRAW,

Sworn to and subscribed before me
30th day of March, 1921.

[Seal] MARTIN J. WIEME
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No. 202.
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Collier, Inc., Barron G.

Air Aftercoolers
Chicago Pneumatic Tool Co.
Ingersoll-Rand Co.

Air Receivers
Chicago Pneumatic Tool Co.
Ingersoll-Rand Co.

Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Angle Bars
Lackawanna Steel Co.

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Axles
Bemis Car Truck Co.
St. Louis Car Co.

Axles, Car Wheel
Bemis Car Truck Co.
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Westinghouse Elec. & Mfg. Co.

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Babbitt Metal
More-Jones Brass & Metal Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

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Columbia M. W. & M. I. Co.
General Electric Co.
St. Louis Car Co.
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Stucki Co., A.

Bearings, Oilless, Graphite, Bronze and Wood
Bound Brook Oil-less Bearing Co.

Bearings, Roller and Ball
Gurney Ball Bearing Co.

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Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
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Niles-Bement-Pond Co.

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National Tube Co.

Bond Testers
American Steel & Wire Co.

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Electric Ry. Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.

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Copper Clad Steel Co.
Electric Ry. Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

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Niles-Bement-Pond Co.

Boxes, Junction and Outlet
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Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

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National Ry. Appliance Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
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Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Traction Brake Co.

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Corliss Carbon Co
General Electric Co.
Jeandron, W. J.
Morganite Brush Co., Inc.
United States Graphite Co.
Westinghouse Elec. & Mfg. Co.

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Columbia M. W. & M. I. Co.

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National Metal Molding Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.

Bushings, Graphite and Wooden
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Cambric Tapes, Yellow and Black
Irvington Varnish & Insulator Co.

Cambric, Yellow and Black Varnished
Irvington Varnish & Insulator Co.

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Kuhlman Car Co., G. C.
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Ohio Brass Co.

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National Metal Molding Co.

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General Electric Co.

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Comstock Mfg. Co.
Electric Service Supplies Co.

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Comstock Mfg. Co.
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Electric Service Supplies Co.

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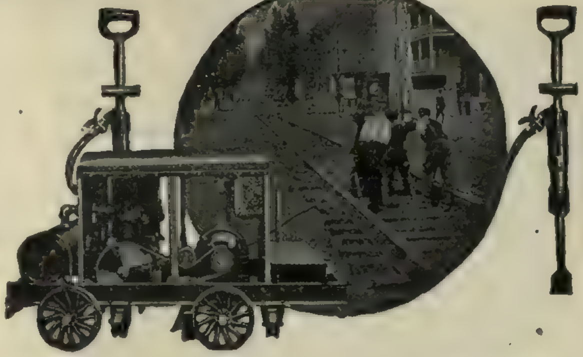

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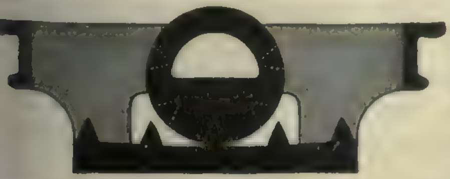

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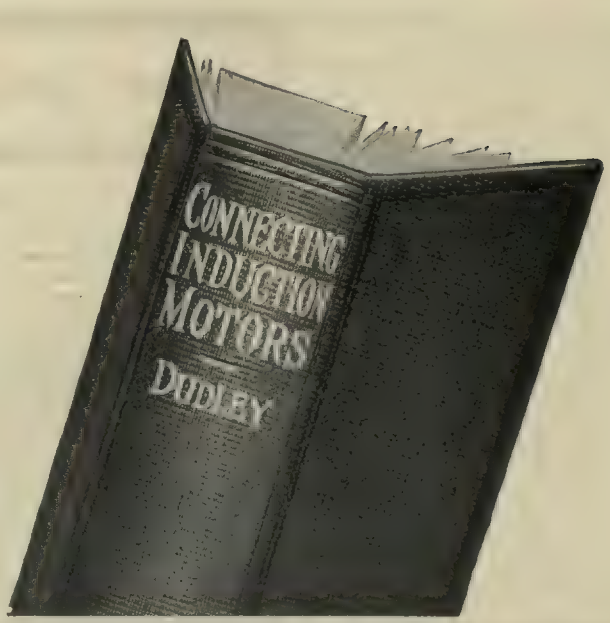

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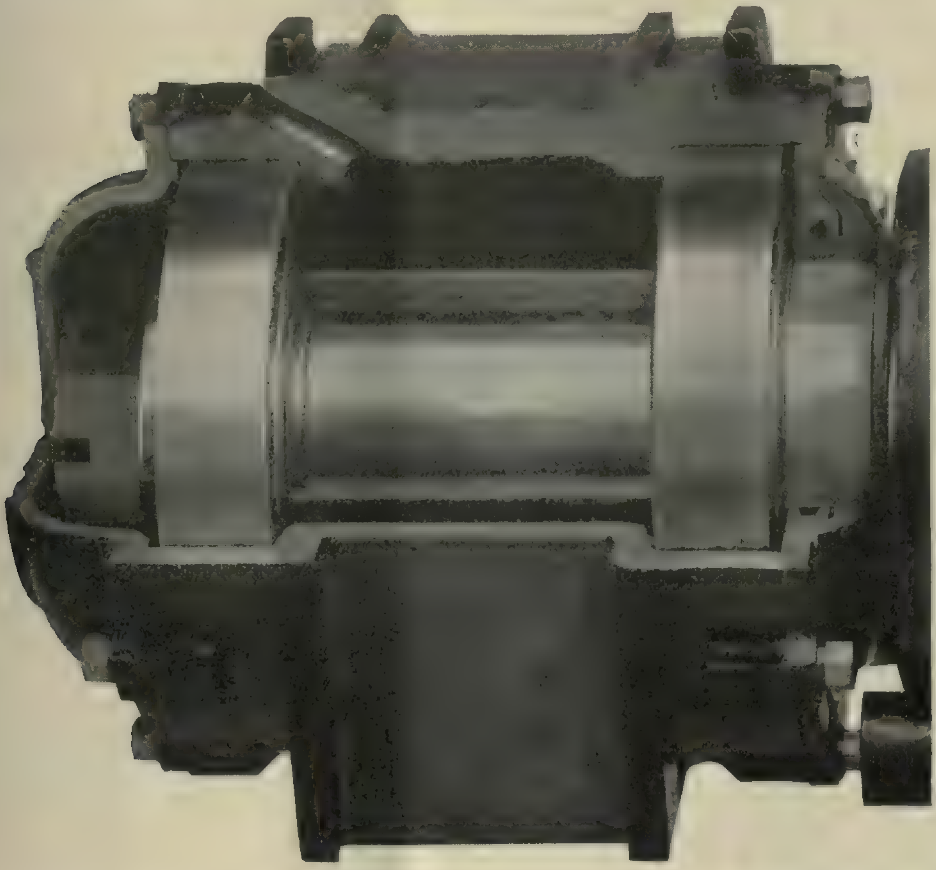
LET US FIGURE ON YOUR NEXT REQUIREMENTS
GOLD CAR HEATING & LIGHTING CO., 17 Battery Pl., New York

As Abraham Lincoln remarked

when his attention was called to the rat hole in the corner of his office: "This is something that will bear looking into."



This cut shows something of the inner make-up of the successful *Gurney Ball Bearing* Journal Box for Railway cars.

On thousands of car journals it is standing up under the peculiarly rough service that had hitherto put ball bearings in journal boxes out of commission.

In the Gurney Journal Box the Radio-Thrust bearings take the heavy thrust loads received when crashing over frogs and switches and around curves as no other bearing has ever been able to do.

GURNEY BALL BEARING CO.
Conrad Patent Licensee
Jamestown, N. Y.

GURNEY
BALL BEARINGS

18103

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DAVIS STEEL WHEELS
Standard for Electric
Railway Service
AMERICAN STEEL FOUNDRIES
1100 McCormick Building Chicago

MASON SAFETY TREAD—Lead or carborundum filled; non-slippery, prevents accidents; cuts out damage suits
KARBOLITH CAR FLOORING—For steel cars; is sanitary, light weight, fire proof, non-slippery.
STANWOOD STEPS—Self-cleaning, non-slippery, light
Over six million feet used without accident being reported within the knowledge of manufacturer. Our products used on all leading railroads on cars and stations For details address:
AMERICAN MASON SAFETY TREAD CO., Lowell, Mass
Branch Offices: Boston, New York City, Philadelphia
Agencies in all principal cities
Joseph T. Ryerson & Son, General Western Distributors

PS
HEATERS
Car Heating and Ventilation
is one of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.
The Peter Smith Heater Company
1725 Mt. Elliott Ave., Detroit, Mich.

ELECTRICAL CONDUITS AND FITTINGS
— WRITE FOR BULLETINS —
National Metal Molding Co.
PITTSBURGH, PA.

BUCKEYE JACKS
high-grade R. R. Track and Car Jacks
The Buckeye Jack Mfg. Co.
Alliance, Ohio

Aladdin's Lamp
has nothing on the
"Searchlight"
When an advertiser sells equipment for over $4,000.00 through "Searchlight" advertising that cost $12.00, we think "Searchlight" is at least entitled to "favorable mention."
Searchlight Section
Employment — Equipment — Business Opportunities
615

Collier Service

Just One Example of What Goes Into Collier Service

It would take a large volume to describe the organization that has made Collier Service synonymous with the best in car-card advertising.

But perhaps a reference to but one sub-department of the Collier Service organization may help to give a conception of the whole.

This is our perpetual inventory of Collier Service cars whereby we maintain records of scores of thousands of cars, not merely by number, but by location and the names of the advertisers' cards occupying the spaces, the kind of card on display, when each card was installed, when it is to be removed, and so on.

The cost of maintaining this particular means of seeing that every Collier Service advertiser is treated according to contract and that your car-card space is used to bring the utmost in results to all parties in interest runs over $200,000 per year.

Barron G. Collier
INCORPORATED
Candler Building, New York

COLUMBIA EQUIPMENT

For the

Rolling Stock
Car Barn
Repair Shop
Line

Twenty-nine years of experience in putting out practical shop tools, equipment and supplies has brought to this company a wealth of experience that is at your service.

We have in our plant dies, jigs, templates, patterns and equipment for turning out immediately practically all types of electric railway equipment parts that have been in use for the past decade.

At this time we are particularly well fitted to supply the demands of the industry for forgings. We are serving more and more companies each month in the production of equalizer bars and brake rigging. Let us submit figures on your needs.

TOOLS

- Armature and axle straighteners
- Armature shaft straighteners
- Armature buggies and stands
- Babbitting molds
- Banding and heading machines
- Car hoist
- Car replacers
- Coil taping machines for armature leads
- Coil winding machines
- Pinion pullers
- Pit jacks
- Signal or target switches
- Tension stands

CAR EQUIPMENT

- Armature and axle bearings
- Armature and field coils
- Bearings (axle and armature)
- Brush-holders and brush-holder springs
- Brake, door and other handles
- Brake forgings, rigging, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or malleable iron)
- Grid resistors
- Third rail shoe beams and accessories
- Trolley poles (steel) and Wheels

The Columbia Machine Works & Malleable Iron Company

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

A. A. GREEN, Sales Mgr., 50 Church St., New York City
ERNEST KELLER, FRANK C. HEDLEY, Brooklyn, N. Y.
E. ALLISON THORNWELL, 1026-7 Atlanta Trust Bldg., Atlanta, Ga.

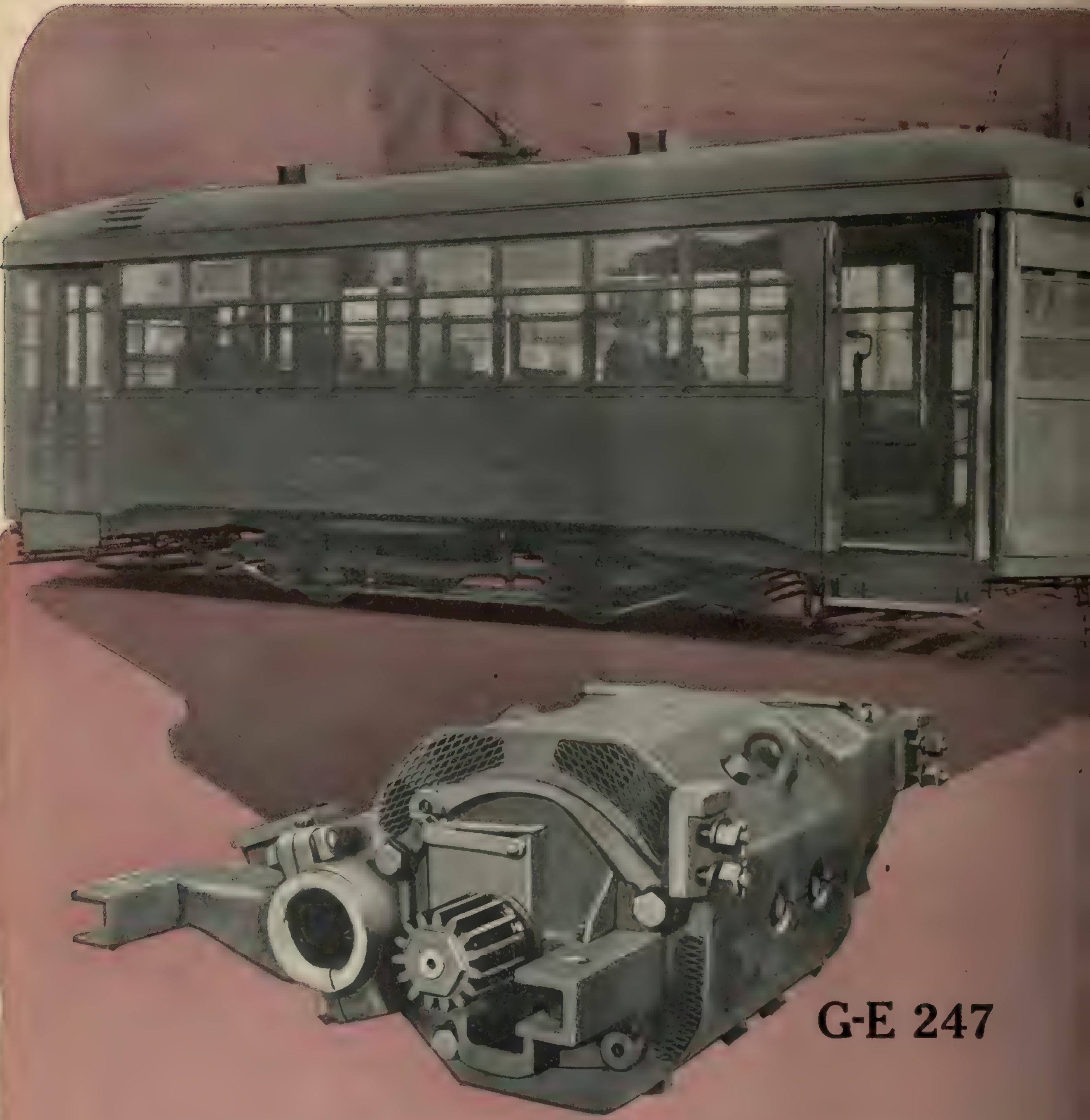
J. L. WHITTAKER, 141 Milk St., Boston, Mass.
F. F. BODLER, 903 Monadnock Bldg., San Francisco, Calif.
W. McK. WHITE, 343 South Dearborn St., Chicago, Ill.

THE PETER WITT CAR

The Peter Witt large capacity car "absorbs" large crowds through its double-entrance doors on front platform and, having the "pay-as-you-pass" method of fare collection, congestion is also eliminated at unloading points. Passengers moving to the rear pay their fares upon entering and at their destination depart without delay.

The Peter Witt car is ideal where large crowds must be loaded and unloaded quickly.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. — ST. LOUIS MO. — G. C. KUHLMAN CAR CO. — CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.



160,000 to 200,000 Miles Without Overhauling

"We have five cars that were put in service Dec. 1, 1916.

"They weigh a little less than 24,000 pounds each, are single truck, and equipped for double-end operation with two G-E 247 motors on 34-inch wheels.

"This month (November 1920) we are just taking out these motors for the first time to put in new bearings, turn and slot the commutators and clean them up.

"The cars have run from 160,000 to 200,000 miles each in the four years, and the motors have never been touched except for the usual night inspection."— Dudley Montgomery, Vice-president, Madison Railways Co., Madison, Wisconsin.

Thousands of single truck cars like these are being operated with worn out, obsolete motors. Why not replace them with the G-E 247—cut your maintenance expense and increase the reliability of your service.

General Electric Company

General Office
Schenectady, N.Y

Sales Offices in
all large cities

25-101

w-Hill Co., Inc. April 16, 1921 Twenty Cents Per Copy

Monthly Mechanical and Engineering Edition

ELECTRIC RAILWAY JOURNAL

Permanent Track Construction a Realit

The RWB Dynamotor has accomplished for electric railways the seemingly impossible—permanent track construction. This has become a reality and future repair costs are cut to a minimum.

With this equipment rail joints and bonds are satisfactorily and economically welded, and worn rails and special manganese work built up. When not required for track work the equipment is used in the shops for welding shafts, gear cases, car wheels, etc.

The widespread and successful use of the RWB Dynamotor proves its tremendous value to every progressive electric railway.

IL WELDING AND BONDING COMPANY

Formerly the Lincoln Bonding Co.

Electric Railway Operating Economy

What is really needed is a type of car that provides maximum economy during rush-hours, as well as capacity flexibility and economy during light-traffic periods.

Why adopt large, heavy cars and trailer operation for the maximum demand, and forego economy during the longer light-load periods?

Why use heavy cars, and saddle high-maintenance costs for ages on tracks, trucks and equipment,

When it is possible to secure light, double-truck cars for reliable and economical operation during non-rush hours as single cars, and for two- or three-car trains during rush hours, by equipping them with Westinghouse HL Multiple-Unit Control?

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

ol. 57, No. 16 New York, April 16, 1921 Pages 709-756

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing-Editor

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A franchise is not always a contract. How can the efficiency of the shop personnel be increased? The American engineering standards committee a going concern. Don't be too mechanical in rating men. Surface trunk lines make for speedier service. Motor trucking not yet a science. He who writes specifications should know materials. What if there is no exhibit this year?

Large Special Trackwork Renewal 712
By E. P. Goucher
The entire layout at Fourteenth and U Streets, N. W., Washington, D. C., was renewed and additional special work was installed by the Capital Traction Company without interfering with the regular operation. The surface work was set up on an adjacent lot before installation to insure rapid assembling.

Maintenance Cost Accounting 715
By E. A. Palmer
System used by San Francisco-Sacramento Railroad has proved invaluable as means of supplying actual cost data from which to decide whether maintenance of various parts of equipment is satisfactorily carried on in relation to road performance.

Electrical Insulating Materials 719
By Norman Litchfield
The most essential characteristics of insulating materials are high dielectric strength and ohmic resistance, but ability to withstand considerable mechanical stress and heat is also desirable.

Resilient Track Laid in Wausau 723
Company operating in small Wisconsin city is free from paving burden. Constructs track ahead of paving work which is done by the city.

Swiss Electric Locomotive Progress 725
Details are given of recent locomotives equipped by the leading two builders of electrical apparatus in Switzerland. Particular attention is given to the machines for the Federal Railways. Some experiments with new types of drive are included, indicating a leaning toward gears as a substitute for side rods.

Combined Signal and Switch Installation 728
Somewhat novel equipment consisting of an electric track switch operating in conjunction with block signals on a single track installed by the Terre Haute Traction & Light Company.

Determination of Forces on Eccentric Levers and Bell Cranks 729
By H. M. P. Murphy
Methods for determining the forces developed by eccentric levers and standard bell cranks are given, also general methods of applying the leverage rule, together with simplified solutions and rules for solving brake leverage problems by using the proportional lengths of levers instead of their actual length.

Raising a 500-Ton Concrete Culvert 733
By D. E. Crouse
A washout on the lines of the Rochester & Syracuse Railroad undermined the entire footing of a culvert which was successfully salvaged by raising to its original position.

Providence Engineers Discuss Electrification 734
At joint meeting of Providence Engineering Society and Providence Section of A. I. E. C., C. C. Whittaker outlines electrification status on a number of steam railroad properties.

Annual Report of the A. E. Standards Committee 734
This national clearing house for technical information is now a going concern. Contributions from industrial associations and companies interested will be required to supplement dues.

Why Alter the Standard Safety-Car Design 735
By J. C. Thirlwall
Advantages and disadvantages of double-door type of construction with longer platforms are discussed and data are given regarding power consumption and passenger interchange time.

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Member Associated Business Papers, Inc.

Circulation of this issue, 6,850 copies

Advertising Indexes—Alphabetical, 72; Classified, 66-68-70; Searchlight Section, 64-65

Solving The Interurban Problem—

One of the Missouri & Kansas Railway Automatic Substations

The substation operator, on a basis of work done, is the highest paid man on the suburban railway. His salary, when taken together with equipment costs and upkeep, presents an international interurban railway problem.

An effective solution of this problem was recently obtained by Missouri & Kansas Railway men cooperating with Westinghouse engineers, and their foresight has shown the way for every interurban railway to *reduce operating expenses* and *increase efficiency.*

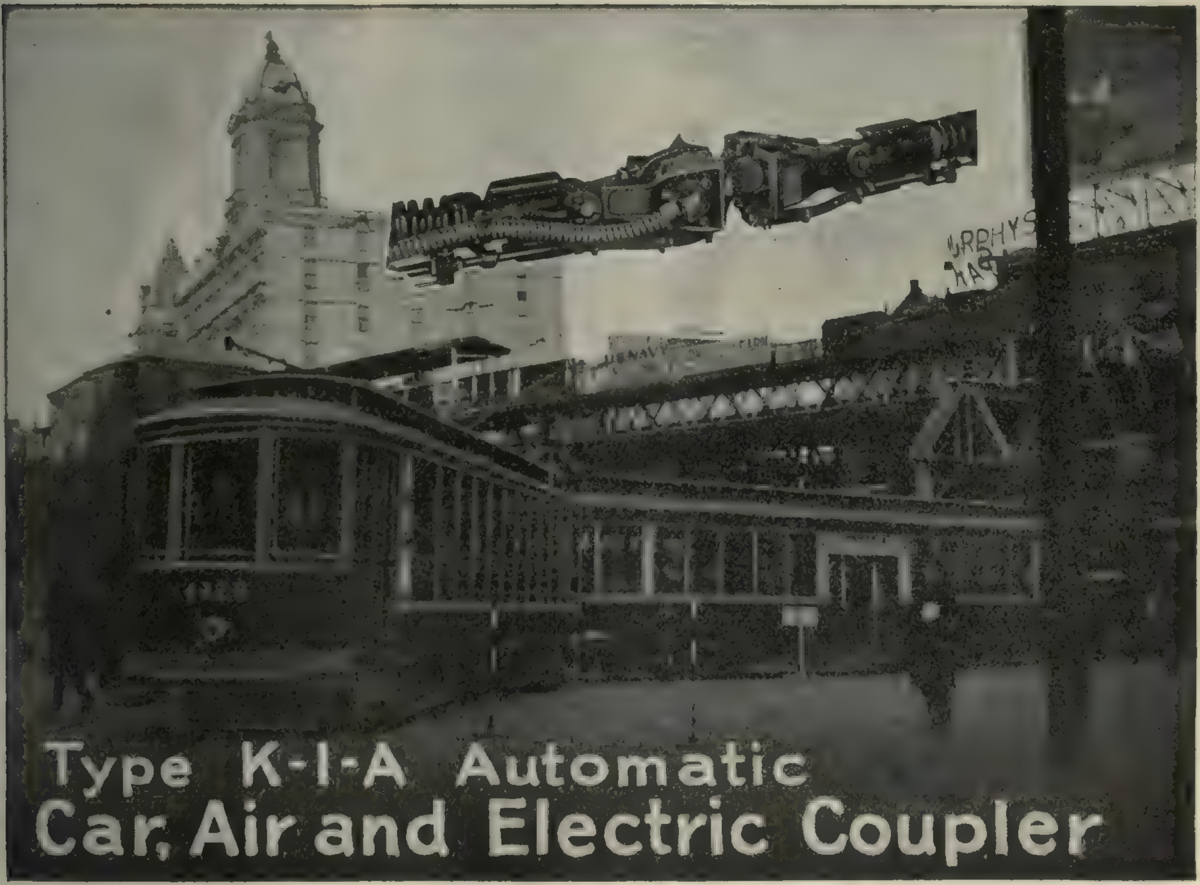
Two Westinghouse *automatic* substations on this line are now handling a daily load with exceptional ease and with absolutely no attention outside of an occasional inspection. Although extremely simple in design, these stations are highly efficient.

Let Us Solve Your Problem

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.
Offices in all Principal American Cities

Westinghouse
Automatic Substations

"TIGHT LOCK"



OR WITHOUT THE ELECTRIC FEATURE

HERE is one of the most popular and efficient members of the Tight Lock Coupler Family—designed primarily for the lighter forms of multiple-unit operation, such as surface line trains.

Couples car, air and electric connections automatically and simultaneously. Banishes slack and consequently eliminates shocks, enabling the train to be operated with the same smoothness as a single unit.

Nineteen electric contacts of the butt type are incorporated in the coupler head, each insulated for 600 volts 25 amperes and protected from the weather by a rubber gasket after coupling is made. During compression each contact is made to rotate, thereby subjecting the contact surfaces to a rubbing or scouring effect that removes dirt or other nonconducting material which may have collected prior to coupling.

When breaking up a train the latches of both couplers are manually untripped, in which position they remain until the cars are separated, the separation automatically tripping the latch back to locking position. This is important in making up trains, as the couplers are always set and ready to be coupled again without further manual action.

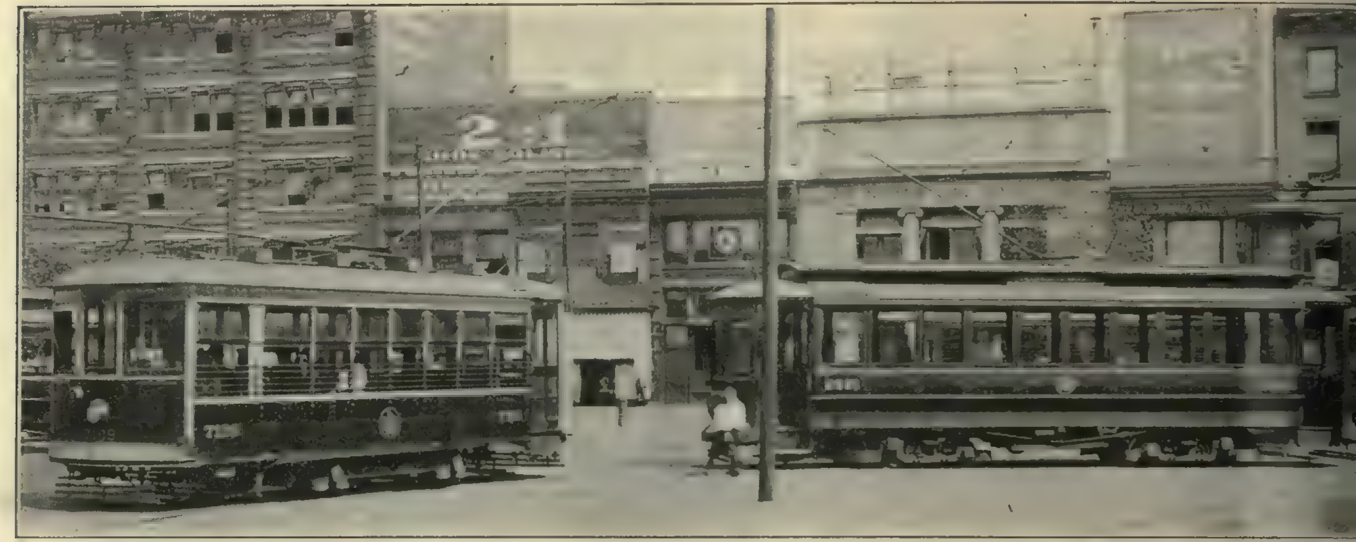
Type K-1-A couplers may be used with or without the electric portion, provision having been made so that the electric feature can be added at any time.

Westinghouse Traction Brake Company

General Office and Works: Wilmerding, Pa.

"Fourteen Miles East of Pittsburgh"

New York **Washington** **Chicago**
San Francisco **Pittsburgh** **St. Louis**



Cross-seat safety car and longitudinal-seat two-man car at Williamsburg Bridge Plaza, Brooklyn

Here's a Pleasant Parallel for the Safety Car!

Operating Costs In Cents per Car-Mile

	Safety Cars	Other Cars	Saving per cent
Maintenance of way and structure	1.6	3.3	52
Maintenance of equipment	1.7	3.6	53
Power	1.9	3.8	50
Transportation	8.4	13.9	40
General	2.4	3.2	25
Total operating cost	16.0	27.8	42.5

(Table based upon results with more than 500 Safeties as presented by J. C. Thirlwall, ELECTRIC RAILWAY JOURNAL, Oct. 2, 1920)

Ask any experienced user of the Safety Car and he will tell you how much it has helped him to absorb higher expenses, not only through savings in operating cost but through gains of *new business.*

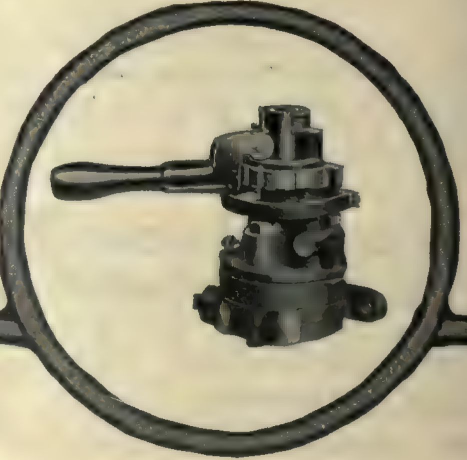
There is not a single branch of electric railroading from track to accident claims that has failed to benefit from Safety Car operation.

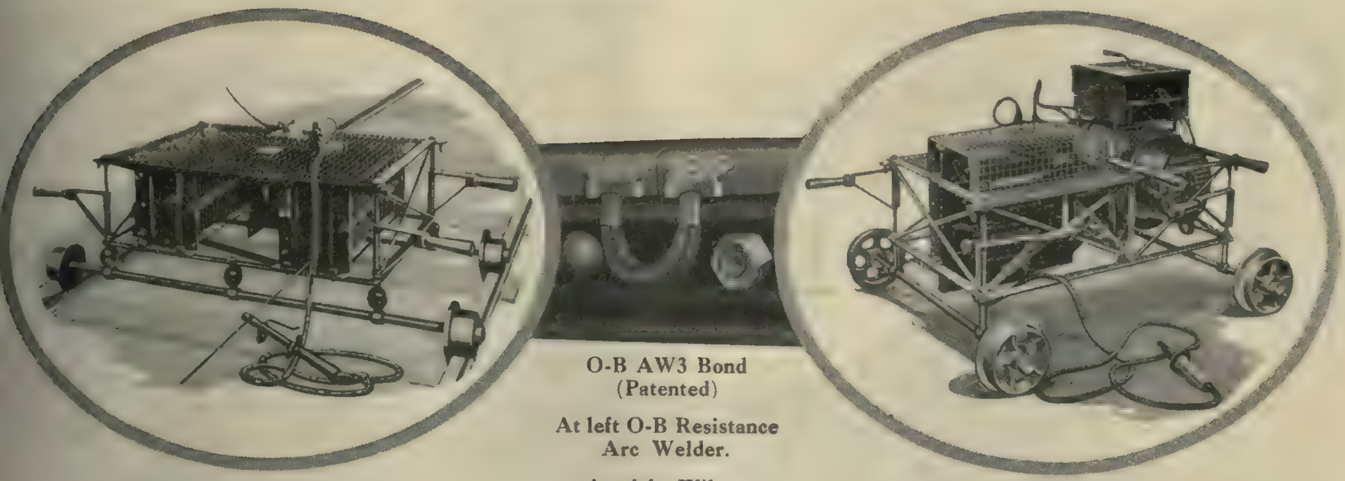
Bear in mind, please, that the foregoing results were obtained solely with the Safety Car equipped with our Safety Devices Combination in which

It is a Safety Car Only—

when equipped with automatic laborless apparatus, so interlocked, that regardless of the illness or distraction of the operator, the power will be cut off instantaneously, the airbrakes and sander applied immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed and the step folded before the car can start, and when the air brake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

Safety Car Devices Company
Boatmen's Bank Bldg., St. Louis
Chicago San Francisco New York Washington Pittsburgh





O-B AW3 Bond
(Patented)

At left O-B Resistance
Arc Welder.

At right Wilson
Plastic-Arc
Rail Bond Welder

Now You Can Have Complete O-B Arc Weld Bonding and Track Work Service

Six years ago this summer the first commercial installation of welded rail bonds was completed—and it was with the O-B Gas Weld Bond. As electric welding developed O-B Gas Weld Bond was brought out. It inherited directly two features of the pioneer gas weld bond—the right angle welding scarf and protection for the strand. It also included the "Steel to Steel with Steel" idea which is essential to good electric welding.

O-B Resistance Arc Welder came next. It is a convenient inexpensive machine with a unique safety control panel which speeds the work and protects the operator.

And now we have the Wilson **Plastic-Arc** Rail Bond Welder. It is a splendid dynamotor which applies the latest and best principles of electric welding to rail bonding and track work. Controlled current, short arc and uniform heat are the outstanding characteristics of this latest Rail Bond Welder.

So we offer you a complete arc welding service for rail bonding, rail welding, and shop repair work. Do you want specific information on any of these subjects?

The Ohio Brass Company, Mansfield, Ohio

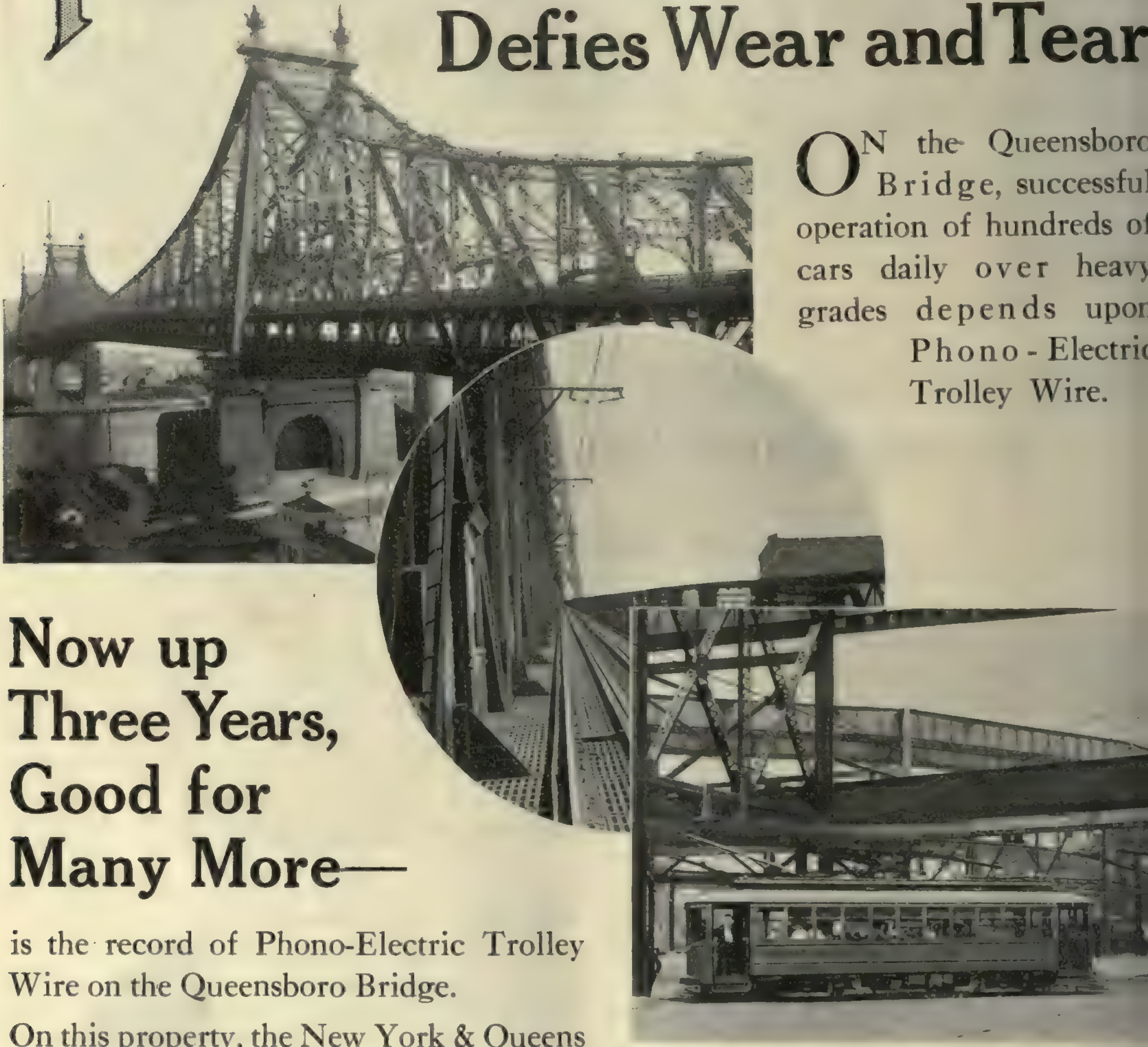
New York
Pittsburgh
San Francisco
Philadelphia
Chicago
Los Angeles
Paris, France

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1921

Manufactures:—Rail Bonds; Trolley Materials; High Tension Porcelain Insulators; Third Rail Insulators; Car Equipment.

Phono-Electric

Defies Wear and Tear



ON the Queensboro Bridge, successful operation of hundreds of cars daily over heavy grades depends upon Phono-Electric Trolley Wire.

Now up Three Years, Good for Many More—

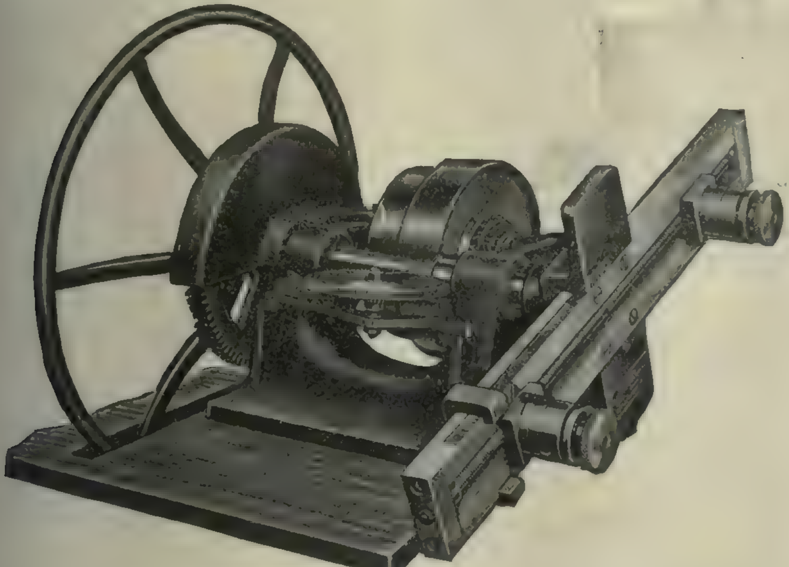
is the record of Phono-Electric Trolley Wire on the Queensboro Bridge.

On this property, the New York & Queens County Railway, Phono-Electric Trolley Wire has given entire satisfaction.

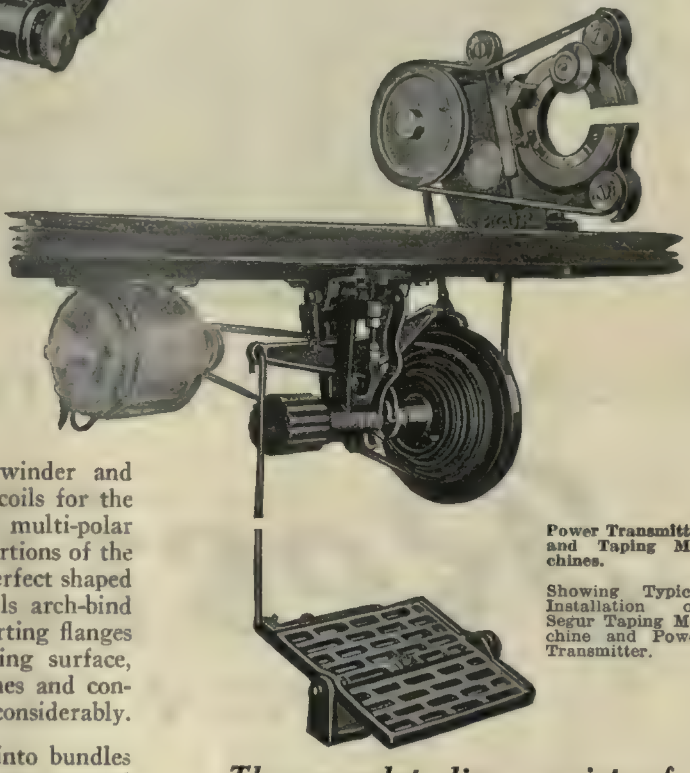
Practically the same report is given of Phono-Electric Trolley Wire everywher regardless of the class of service. For city, interurban or electrified steam road Phono-Electric Trolley Wire is the logical choice because its strength, ductilit and long life have proven that it means economy in the long run.

Bridgeport Brass Company
Bridgeport Connecticut

SEGUR COIL WINDING TOOLS



Hair-Pin Loop Winder and Spreader



Power Transmitter and Taping Machines.

Showing Typical Installation of Segur Taping Machine and Power Transmitter.

The Segur line of armature coil winding tools represents a complete line of apparatus designed for the practical manufacture of armature coils in an accurate manner and with a minimum labor cost.

The Segur Hair-Pin Loop armature coil winder and spreader makes it possible to wind armature coils for the smallest or largest armature or stator for multi-polar machines. In using these machines all slot portions of the coils are made radial with the shaft, making perfect shaped wire-wound coils. The outer portion of coils arch-bind when the armature is wound, thus end supporting flanges are unnecessary, giving the coils more cooling surface, having reduced each coil-turn one to six inches and consequently reducing the armature temperature considerably.

Labor is saved in paring and grouping coils into bundles because all coils that make a bundle for one slot are wound at one time and an operator, after some experience, will wind from 20 to 30 loops per hour, and as each loop contains from two to five coils it is therefore possible to make from 25 to 128 coils per hour.

The use of these tools does away entirely with the need for other coil forms and the saving in slot room is from .010 to .060 inch, due to the reason that the loop bundle is dipped as one unit instead of as separate coils.

All Segur tools are substantially built for hard and long service, and if properly used should require no expense for maintenance. The material and workmanship are of the best, all parts subject to wear being made of tool steel.

The complete line consists of the following:

Hair-Pin Loop Winder.
Coil Spreader.
Armature Coil Taping Machine.
Coil Winding Lathe Head.
Magnet Wire Reel Rack and Tension Device.
Commutator Screw Press.
Field and Magnet Wire Taping Machine.
Armature Copper Bar Bender.

ELECTRIC SERVICE SUPPLIES CO.

Electric Railway and Mine Haulage Material

PHILADELPHIA
17th and Cambria Sts.

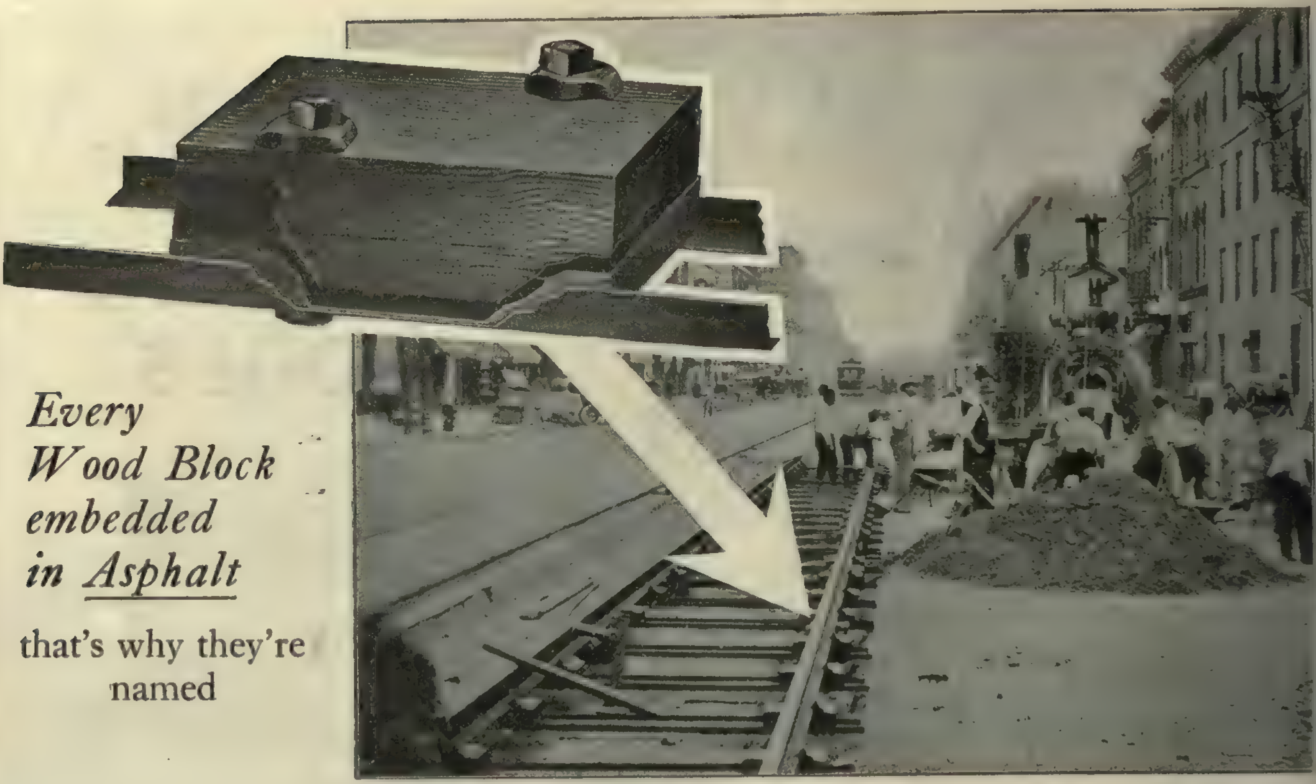
PITTSBURGH
337 Oliver Bldg.

SCRANTON
316 N. Washington Ave.

NEW YORK
50 Church St.

CHICAGO
Monadnock Bldg.

Canadian Distributors: Lyman Tube & Supply Co., Montreal, Toronto, Winnipeg



Every Wood Block embedded in *Asphalt*

that's why they're named

DAYTON

Resilient

RAILWAY TIES

The hammer blow of traffic is effectively transmitted to the concrete foundation thru any thickness or extent of steel and causes disintegration of the concrete underneath. The combination of wood and asphalt in the Dayton Tie dissipates the hammer blow from the car wheel and protects the foundation.

Remember—the *shock* MUST go *somewhere.* Keep it from the concrete—the Dayton way.

THE DAYTON MECHANICAL TIE COMPANY
704 COMMERCIAL BUILDING, DAYTON, OHIO

Stepping Aboard a Toledo Peter Witt Trailer

Women Workers Will Appreciate Your Action

Standardize! Pneumatize!

In these days women of every age are engaged in industry.

Hampered, as they are by looser clothing, they are greater step and platform accident risks than men.

Here comes in one of the auxiliary advantages of National Pneumatic Door and Step Control for the less the car operator uses his hands for door and signal operation, the more he can use them for assisting the women riders to get aboard or leave without tripping over an entangled skirt or a pinched cloak.

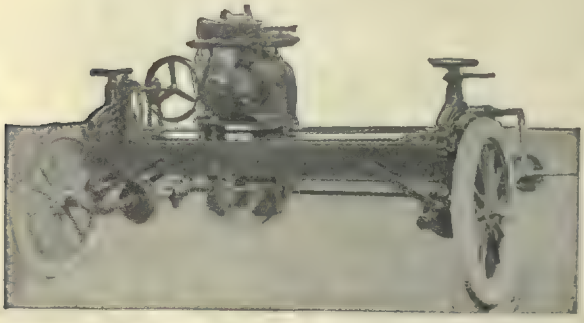
Follow the Toledo Railways & Light Company which plays safe by using the whole National Pneumatic trio of Door Engines, Motorman's Signal Lights and Safety Interlocking Door Control for its two-car trains!

National Pneumatic Company, Inc.

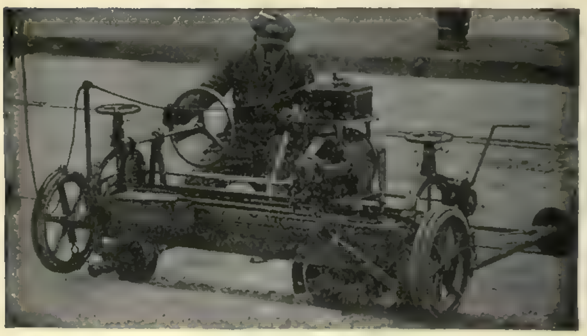
50 Church Street, New York **Edison Bldg., Chicago**
Works: Rahway, N. J.

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd., Toronto, Ont.

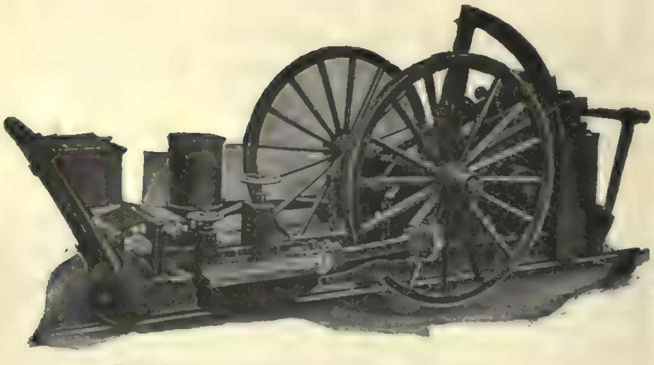
A Dollar a Day Keeps Rail Trouble Away



Universal Rotary Track Grinder



Atlas Rail Grinder



Reciprocating Track Grinder

This truth should be spread throughout the entire industry.

Scrapping worn rails is too costly to be considered except as a last resort.

Operating on poor track may cost even more.

Keeping track in good condition and restoring poor track to good condition are inexpensive economies.

Corrugated track, cupped joints and battered crossings are readily restored with the help of an efficient rail grinder at a cost that is negligible in comparison with the cost of doing nothing.

A dollar a day covers all carrying and depreciation charges for the best rail grinder made. You can even buy a good grinder for half of that. Either will help save the rails.

Would you rather save a dollar or save the rail?

If your rail is corrugated and joints are cupped the Reciprocating Track Grinder will help to save the rail.

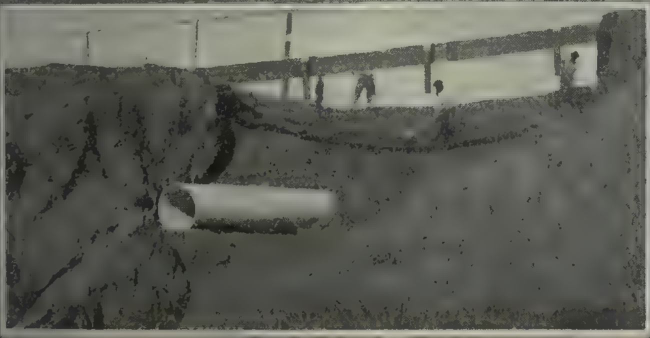
If you are making track repairs with an arc welding set the Atlas Rail Grinder or the Universal Rotary Track Grinder will remove the surplus metal used in building up the low joints and help to save the rail.

Save the Rail and Don't Delay

We are always glad to tell what our experience has been in solving any particular set of problems. Can we be of service to your road?

Railway Track-work Company
3132-48 East Thompson St., Philadelphia

Armco Culverts



Economy of Transportation — Some conception of the economy of transporting Armco Culverts may be gained from the photograph to the left which illustrates a method of loading. This flat car contains 261 Armco Culverts ranging in diameter from 8 to 36 inches and having a total length of 4,470 feet. The weight, including 75 connecting bands, is only 60,495 pounds.

Easy to Carry—In smaller sizes and reasonable lengths, Armco Culverts may be carried by one or two men. The view to the left shows a man easily carrying a section of Armco Culvert 18 inches in diameter and 14 feet long. When larger diameters and greater lengths are to be moved into position, they may be rolled by a few men.

Easily Installed — No heavy, cumbersome and costly machinery is required for the installation of Armco Culverts. In numerous instances it is only necessary to dig a trench and roll the culvert in place. At times when it is not permissible to dig a trench across railroads or important highways, a tunnel may be dug under the roadbed and the culvert inserted.

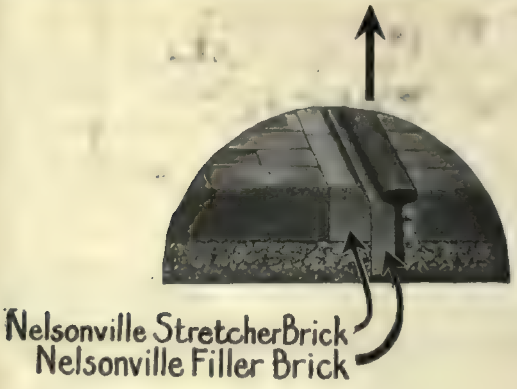
Permanence Assured — The chemical purity, homogeneous texture and heavy galvanizing of Armco Ingot Iron, from which Armco Culverts are made, enables them to resist rust and the deteriorating action of soil or climate. The installation shown here was made under a dirt road in 1911—paved over as a permanent installation in 1913—and in perfect condition today.

ARMCO
Resists Rust
Ingot Iron

There is a manufacturer in nearly every state, and in Canada, making genuine rust-resisting ARMCO CULVERTS and other products of Armco Ingot Iron such as flumes, siphons, tanks, road signs, roofing, etc. Write for full information and nearest shipping point on products in which you are interested.

ARMCO CULVERT & FLUME MFRS. ASSN.
215 NORTH MICHIGAN AVE. CHICAGO

Tee Rail
with
NELSONVILLE
FILLER AND STRETCHER **BRICK**



Make An Ideal Combination for Permanent Paving

Although "T" Rail weighs less, costs less and wears longer than Girder rail, the tendency of the blocks between the rails to "kick up" has always been a serious objection to the use of "T" rail in paved streets.

Nelsonville filler and stretcher Brick does away with "kick up" dangers by absorbing all vibration.

In addition to permitting the use of a lighter and less expensive rail, Nelsonville Filler and Stretcher Brick makes better paving, lasts longer, increases the life of car equipment by eliminating vibration and reduces construction costs.

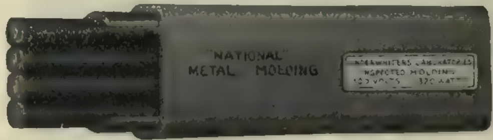
You need our prices before figuring on paving brick.

THE NELSONVILLE BRICK CO.
Nelsonville, Ohio

"All You Require When You Wire"

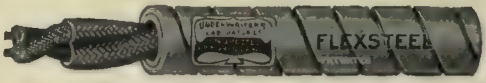
SHERARDUCT Sherardized Rigid Steel Conduit

ECONOMY Black Enameled Conduit



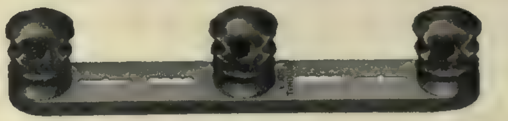
NATIONAL METAL MOLDING
"The Standard for Surface Wiring"

FLEXSTEEL Flexible Metallic Conduit



FLEXSTEEL Armored Conductors

FLEXTUBE Non-Metallic Flexible Conduit



NATIONAL Brackets

LIBERTY Rubber Covered Wire and Cables

Specify NATIONAL Products

for wiring your new or remodeled cars, car houses, substations and Power Plants.

Write for the National Bulletin Catalogs

National Metal Molding Co.

General Offices: Pittsburgh, Pa.

Atlanta
Boston
Chicago
Denver
Detroit

Los Angeles
New York
Philadelphia
Portland
Salt Lake City
San Francisco

Seattle
Buenos Aires
Rio de Janeiro
Sao Paulo, Brazil
Lima, Peru
Santiago, Chile

Medellin, Colombia
Havana
Manila
Mexico City
Shanghai, China

Canadian Distributors: Canadian General Electric Co., Limited.

Shanklin Transfer Machines Have Made Good on Safety Cars

A TRANSFER Every Second

during rush hour stops means minutes gained with resulting faster schedules.

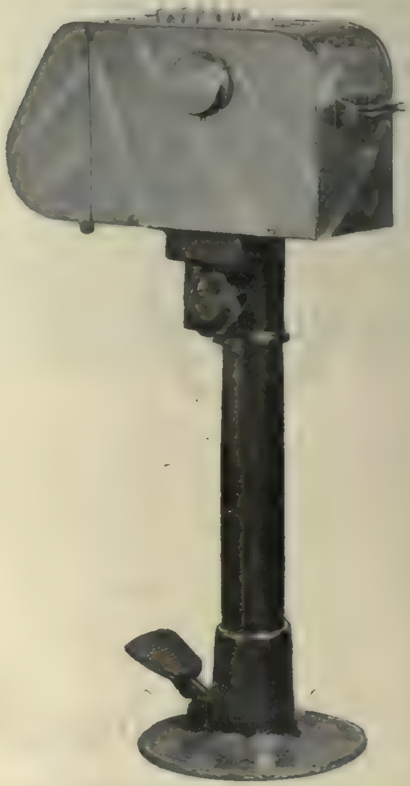
No effort on the part of your operator is necessary. He merely taps a foot lever at the base of the machine and transfers are issued as fast as passengers appear.

When the doors of the safety car are closed, all transfers have been issued and the operator starts the car in less than a tenth of a second.

The cost of transfers has been reduced and the saving over daily dated transfers is more than 40 per cent. The expense of handling and checking is less. The last transfer issued constitutes the conductor's record.

These machines weigh 21 pounds and can be changed quickly from one end of the car to the other. They are valuable on either zone fare or flat fare systems.

Let us show you how to speed up your schedule.



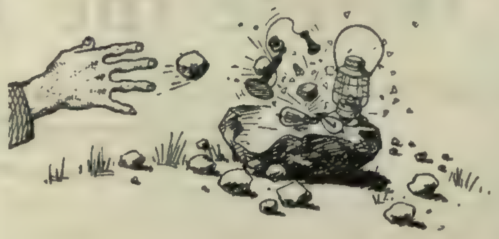
Shanklin Equipment Company, Inc.
Besse System Building, Springfield, Mass.

Another Word For the Utilities

In 1921 the Western Electric Company will run in popular magazines additional advertisements of the character initiated in 1920, asking fair consideration by the Public of the problems of its servants, the Utilities.

One of the series is reproduced here. It asks the same good sportsmanship in playing this "game" that the Public asks for itself when it is "it."

The work will go on. More facts will be presented. Cool judgment in the light of all the facts will be asked to temper the heated remarks generated by moments of friction with the Utilities.



It's a great game if you're on the right side of the rock

POSSIBLY because we are a free people or maybe it's a legacy of our English ancestry, but collectively we've got to be ragging somebody.

As if by common consent we decide on our "goats," and like boys playing duck on a rock we set them up and stone them with prejudices.

In the business world the corporation has had its turn, but perhaps no one kind of business is in a position to be "marked" more than our Public Utilities.

They, by their very relation to the public, must assume a posture most inviting to the "kicker."

We can bawl out a street car conductor, who becomes in that moment his company. A discrepancy of 42 cents on a lighting bill prostrates more good disposition than any 42 cents should. The telephone invites speech which can be hurled with impunity at "Central." So it gets to be the habit.

It would be humorous if it weren't almost tragic—senseless, in the light of the bigger common interest. For the very company which may be the cause of our usually passive irritation is, after all, just a group of people like ourselves who happen to be working at another job.

By their organized unwieldiness these companies are most helpless before the knocks. But maybe there will be fewer knocks now that we have this truer and kindlier picture in mind—a group of human beings giving their lives to a work which benefits us as much as it does them!

They're keeping the lines of communication open so we may talk to near and far, and travel safely in warm and well-lighted comfort. When we wonder how in the world we could get along without these conveniences we suddenly realize just how important this work is.

Too important to risk impeding, for its progress is bound up with the progress of us, the people.

Published in the interest of Electrical Development by an Institution that will be helped by what ever helps the Industry.

Western Electric Company

No. 24 *Wherever electricity is called on to render its manifold services, Western Electric through its 49 branch houses makes the distribution of electrical products more convenient and more economical.*

Where the Buyer Benefits

How More Favorable Buying Conditions Are Being Created by Advertising in This Paper at This Time

Through regular advertising, sellers are making buying opportunities instantly avail-able. By publicly committing themselves in their advertising, they are giving you a strong assurance of faithful performance.

Advertisers are cutting sales costs through the use of advertising as a SALES MACHINE just as they reduce product on costs by improved machinery methods.

LIST OF MEMBERS

Each has subscribed to and is maintaining the highest standards of practice in its editorial and advertising service.

Advertising and Selling
American Architect
American Blacksmith
American Exporter
American Funeral Director
American Hatter
American Machinist
American Paint Journal
American Paint and Oil Dealer
American Printer
American School Board Journal
Architectural Record
Automobile Dealer and Repairer
Automobile Journal
Automotive Industries

Bakers Weekly
Boiler Maker
Boot and Shoe Recorder
Brick and Clay Record
Buildings and Building Management
Building Supply News
Bulletin of Pharmacy

Canadian Grocer
Canadian Machinery & Mfg. News
Canadian Railway & Marine World
Candy and Ice Cream
Chemical & Metallurgical Engineering
Clothier and Furnisher
Coal Age
Coal Trade Journal
Concrete
Cotton

Daily Metal Trade
Distribution and Warehousing
Domestic Engineering
Dry Goods Economist
Drygoodsman
Dry Goods Reporter

Electric Railway Journal
Electrical Merchandising
Electrical Record
Electrical World
Embalmers' Monthly
Engineering and Contracting
Engineering and Mining Journal
Engineering News-Record

Factory
Farm Implement News
Farm Machinery—Farm Power
Fire and Water Engineering
Foundry (The)
Furniture Journal
Furniture Manufacturer and Artisan
Furniture Merchants' Trade Journal

Gas Age
Gas Record
Grand Rapids Furniture Record

Haberdasher
Hardware Age

This means ability to make LOWER PRICES to you.

Advertising in a buyer's own paper caters to his convenience; it saves the buyer's time; it helps the buyer weigh and balance rival claims; when the salesman calls, it saves the time of both buyer and salesman by providing the foundation for intelligent judgment.

None but good concerns are admitted to the advertising pages of members of The Associated Business Papers, Inc.

The seller who is building reputation through advertising will jealously guard that reputation in every transaction, beginning with the merit of the merchandise.

Advertising indicates progressiveness, not alone in selling, but throughout the entire business.

By advertising, the seller is publicly displaying his ability and desire to serve you, instead of silently relying upon the necessity of the buyer to produce orders.

You are invited to consult us freely about Business Papers or Business Paper Advertising

LIST OF MEMBERS

(Continued)

Hardware & Metal
Heating and Ventilating Magazine
Hide and Leather
Hospital Management
Hotel Monthly
Hotel Review

Illustrated Milliner
Implement and Tractor Age
Implement & Tractor Trade Journal
Industrial Arts Magazine
Inland Printer
Iron Age
Iron Trade Review

Lumber
Lumber Trade Journal
Lumber World Review

Manufacturers' Record
Manufacturing Jeweler
Marine Engineering
Marine Review
Millinery Trade Review
Mill Supplies
Mining and Scientific Press
Modern Hospital
Motor Age
Motorcycle and Bicycle Illustrated
Motor Truck
Motor World

National Builder
National Petroleum News
Nautical Gazette
Northwest Commercial Bulletin
Northwestern Druggist
Nugent's, The Garment Weekly

Oil News
Oil Trade Journal

Plumber and Steam Fitter
Power
Power Boating
Power Farming Dealer
Power Plant Engineering
Price Current—Grain Reporter
Printers' Ink

Railway Age
Railway Electrical Engineer
Railway Maintenance Engineer
Railway Mechanical Engineer
Railway Signal Engineer
Retail Lumberman
Rubber Age

Shoe Findings
Shoe and Leather Reporter
Shoe Retailer
Southern Engineer
Southern Hardware & Implement Journal
Sporting Goods Dealer
Starchroom Laundry Journal

Tea and Coffee Trade Journal
Textile World

Welding Engineer
Woodworker

THE ASSOCIATED BUSINESS PAPERS, INC.

JESSE H. NEAL, Executive Secretary

HEADQUARTERS: 220 West 42nd Street NEW YORK CITY

The General Manager Said "That's a Good Way to Build Track"

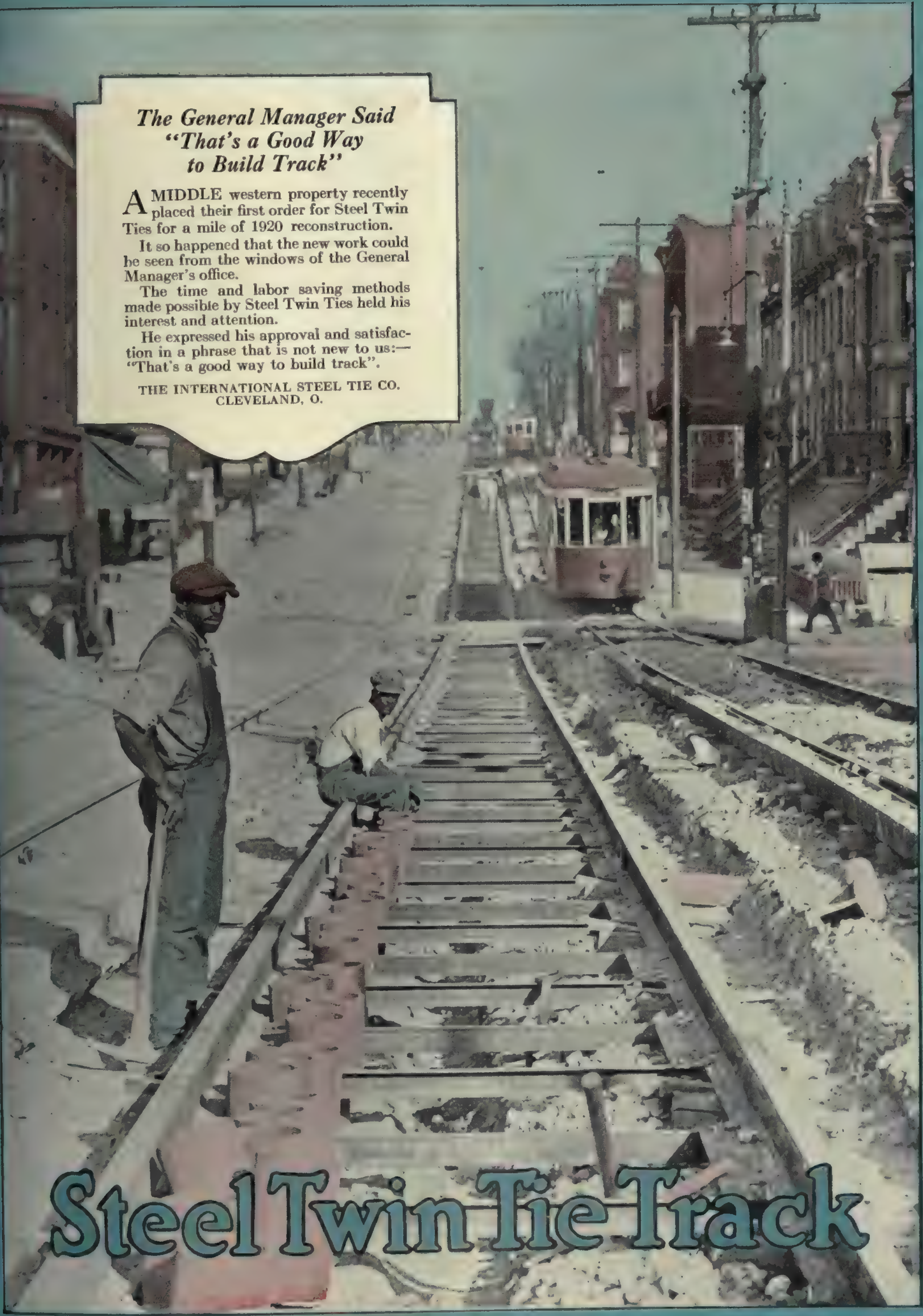
A MIDDLE western property recently placed their first order for Steel Twin Ties for a mile of 1920 reconstruction.

It so happened that the new work could be seen from the windows of the General Manager's office.

The time and labor saving methods made possible by Steel Twin Ties held his interest and attention.

He expressed his approval and satisfaction in a phrase that is not new to us:—"That's a good way to build track".

THE INTERNATIONAL STEEL TIE CO.
CLEVELAND, O.



MORE years of Life and less maintenance. That is what you want from track. You want track that you can lay and then forget about cost, because its cost per year of life is lower than anything you could expect, regardless of first cost.

But others are persistently curious about initial costs; and appropirations must be stretched over urgently needed construction.

The answer to your problem is Steel Twin Tie Track. Its permanence and initial economies are attracting an increasing number of users every year.

The first step of course is estimating. We will be glad to put the data in the mail on receipt of your request.

THE INTERNATIONAL STEEL TIE CO.
CLEVELAND, O.

DUFF GENUINE BARRETT JACKS

A Jack for Every Job

DUFF JACKS are used by electric railroads all over the world, for every purpose that requires a reliable, rapid, and easily operated lifting tool. Executives prefer them because they save time and labor, enabling one man to handle equipment weighing many tons, which would otherwise require scores.

The men who actually use them like Duff Jacks because they are safe as well as convenient to handle. They know that Duff Jacks can be relied upon to carry their rated load with safety.

The Duff makers have been manufacturing jacks exclusively for more than 38 years and they have learned exactly what conditions must be met in every class of railway service. Careful design, employing only the highest grade of material, ensures ample strength.

Among the Duff Jacks designed especially for electric railway work are Ratchet Jacks, standard tools for repair shops; Emergency Jacks, for replacing derailed cars; Journal Jacks, for removing journal brasses; and Ball-Bearing Screw Jacks, for bridge work.

Whether for laying or repairing track, or for lifting cars or bridges, there is a Duff Jack that is best fitted for the job. Write us for complete information.

THE DUFF MANUFACTURING COMPANY
General Offices and Works: PITTSBURGH
New York Chicago Atlanta St. Louis Houston San Francisco

"Bound Brook" Oil-less Trolley Wheel Bushings are now used by two thirds of America's electric railway systems.

Keep Trolley Wheels in Service

As a utility of more or less standardized nature, the trolley wheel is being judged from a maintenance standpoint.

Proper lubrication at the bearings is fundamental, since this practically eliminates wear and the subsequent replacement of worn-out bushings. The best trolley wheels cannot function properly for any length of time if equipped with ordinary bushings. For the satisfaction that bushings can give, depends inversely upon the maintenance they receive and the amount of attention they require.

"Bound Brook" Oil-less Trolley Wheel Bushings require no attention. Their ends and lattice pattern groves inside are packed solid with a fine, hard, lubricating graphite. A floating surface is thus provided during the complete life of the trolley wheel. Benefit by using these consistently efficient bushings —and keep your trolley wheels in service.

Bound Brook Oil-less Bearing Company

*Specialists in the manufacture of Oil-less Bushings
for more than a third of a century*

Bound Brook, New Jersey

Detroit Office: 1723 Ford Bldg.

BOUND BROOK
OIL-LESS TROLLEY WHEEL BUSHINGS

It's the Emergency

That a circuit breaker must be designed to handle. It's taken for granted that under normal conditions any Circuit Breaker will do the work. It's the emergency that counts.

Like a great liner, a Condit K-1 Circuit Breaker is designed and built to cope with the unexpected, the storm and time of trouble. They're built to meet the emergency —and they do it.

Ask for Bulletin

CONDIT ELECTRICAL MFG. CO.
South Boston 27, Mass.
Manufacturers of Electrical Protective Devices

Specifications: 1, 2, 3 or 4 Pole; Back Connected, Manually or Electrically operated; 100 to 8,000 Amperes; 650 Volts D. C.; Supplied with all usual accessories.

122-17

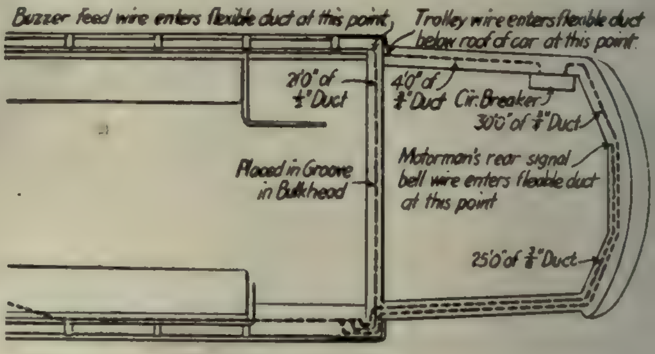
CONDIT

DURADUCT

Has Made Car Wiring Almost Laborless

The first users of Duraduct, the original single-wall, n
metallic conduit with the dotted line on the interior surfa
have almost forgotten the many hours of tedious, expens
labor that they required in the days of metal conduit.

Think of the sinful waste of time for threading and for mak
all those elbows with vise and fixed pulleys compared w
Duraduct which conforms itself almost instantly to any tw
and turn that car-wiring conditions require. As an examp
note the sharp turns in the body corner of the part wiring p


Buzzer feed wire enters flexible duct at this point
Trolley wire enters flexible duct below roof of car at this point
2'0" of ½" Duct
4'0" of ¾" Duct
Cir. Breaker
30'0" of ¾" Duct
Placed in Groove in Bulkhead
Motorman's rear signal bell wire enters flexible duct at this point
25'0" of ¾" Duct

of a Duraducted car. Those turns were made in a few *seconds* as easily as you would wind a tape around your finger.

Better join the Duraduct crowd and write it into your specifications for new cars, too.

DURACORD

The Quality Cord

Outlasts ordinary portable cords under similar conditions many times over. This is made possible by its rugged cover, woven like a piece of fire-hose, and saturated with an acid-resisting and waterproof compound.

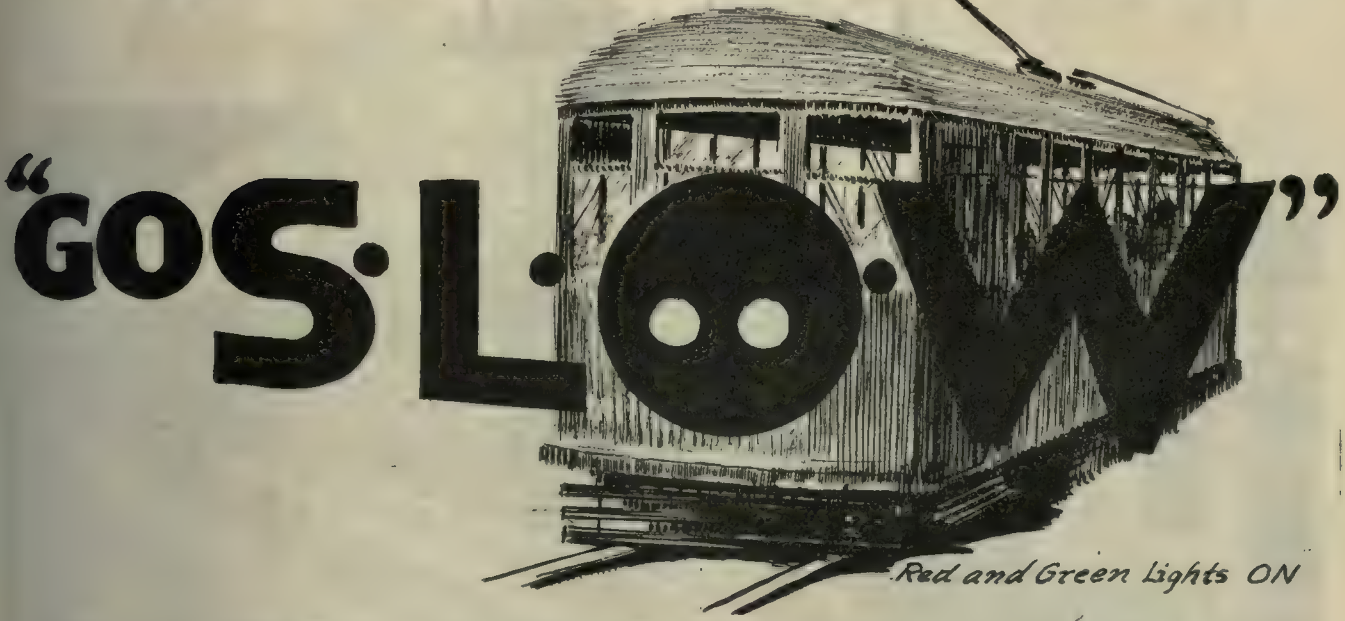
DURACORD is used not only in connection with portable electric tools, welders and lights around the car shop, but its weave gives it the ability to withstand torsion and twisting without unraveling, thus making Duracord suitable for motor leads and train connections in addition to the general purpose of portable cord.

Upon request we will gladly send you samples of Duracord and the common kind so you can make your own tests.

TUBULAR WOVEN FABRIC CO.

PAWTUCKET, R. I.

As though a single brain ruled every move of traffic!


"GO·SLOW"
Red and Green Lights ON

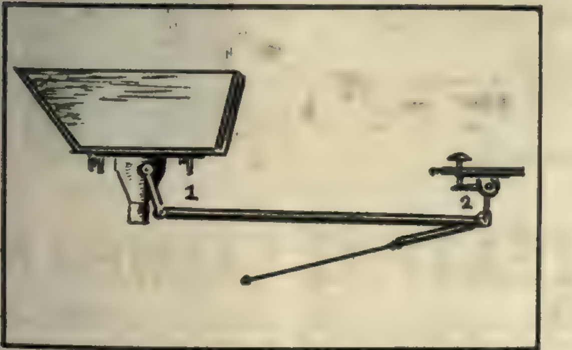
Think of it! Suppose one car suddenly STOPS 100 feet in front of a fast moving car, or a speeding auto-truck.

Instantaneously—(in one ten-millionth of a second, to be exact)—the Nichols-Lintern Indicating Signal on the rear of the *first car* tells the other motorman or chauffeur that the controller is so moving. *Before the car stops, he knows it will*—the instant the controller moves! It is as though he stood beside the first motorman or as though the two cars were *one*, or one motorman ran all the cars and all the auto trucks!

With the distance annihilating speed of light (982 million feet a second) N-L Indicating Signals tell the following traffic what the car ahead will do—go slow—coast—speed up or STOP. There is no excuse for rear-end accidents when these simple red and green lights are used. There is no reason for a man to say he wasn't *prepared* to stop suddenly.

Having knowledge of the movements of the car ahead, other motormen can do *more coasting*, and less false braking, thus reducing wear and tear on wheels, brakes, motors, trucks. There were 3,357 car and vehicle collisions in one big city during 1920. There should be none on your lines when you install N-L Indicating Signals. Write for details.

As though a giant hand suddenly held the car motionless



Here is all there is to it for the Safety Car—rapidly and cheaply installed.

An emergency—the car must stop—and the air fails you! The motorman applies the handbrake and steps on the N-L Sander. Instantly the sand *shoots*, when and where wanted. Almost instantly the car stops. That is all there is to it. You need no air pressure. You waste no sand. You take no chances. Every car that will ever have occasion to make a quick stop should have these Sanders to insure Safety. May we tell you more about them?

Write us today.

The Nichols-Lintern Company

8404 Lorain Avenue, Cleveland, Ohio

CONSOLIDATED

Car Signals

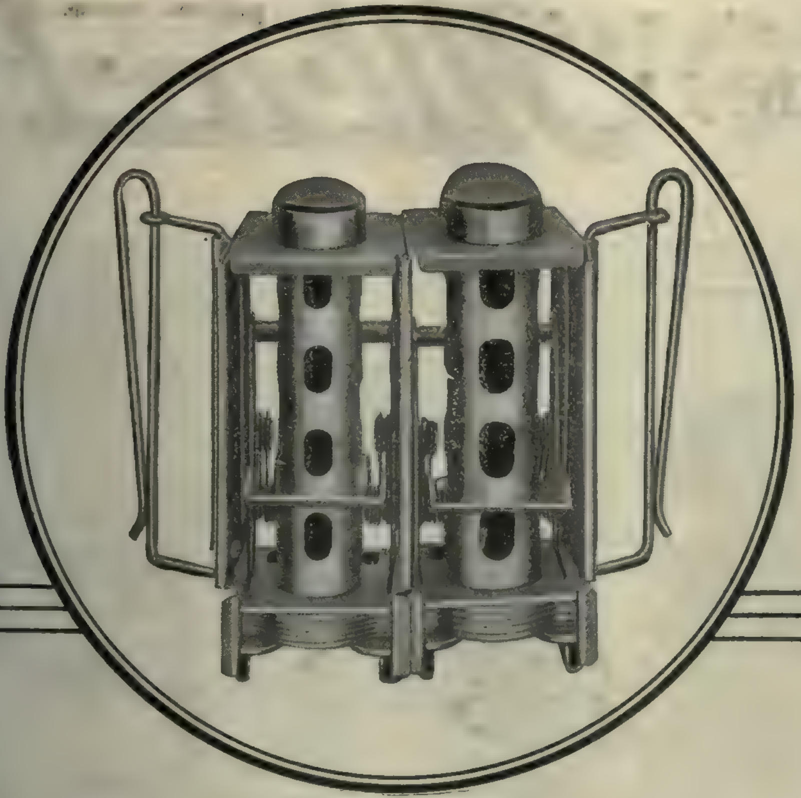
900 Cars of the Interborough Rapid Transit Co
Now Being Equipped for Multiple Car Doo
Operation Will Have Consolidated Trainman'
Indication Signals.

Consolidated car starting and stopping signals for single cars and trains minimize boarding and alighting accidents, and increase schedule speed.

Write us for layout to suit your requirements.

Signal Light

CONSOLIDATED CAR-HEATING COMPAN
ALBANY NEW YORK CHICAG



The only change maker adjustable to the ejection of any required number of coins.

When a screw driver and two minutes' time save $ $ $ $ $

Here are two roads whose fare rates have been increased from 6 to 8 cents. The first road is using old style change makers designed to eject 4 pennies. With the higher rate of 8 cents these old change makers are junked to make way for new equipment constructed to eject 2 pennies.

The second road is using Johnson Change Makers. What happens when the 8 cent rate is put in effect? A shop man takes a screw driver, and in two minutes time he *adjusts* the Johnson to eject *two* pennies thereby saving the cost of new equipment.

The Johnson Change Maker is the only one on the market having this adjustable feature.

Then there's the *flexibility* of the Johnson—flexibility made possible by *unit construction.* Each barrel can be used separately or in groups suitable to meet local conditions. Barrels are designed to handle quarters, dimes, nickels, pennies and metal tickets of two denominations.

The rigid construction of the Johnson Change Maker is a positive guarantee against the ejection of the incorrect number of coins. You can absolutely depend upon the accuracy of the Johnson. Once it is set to eject a certain number of coins it *cannot get out of adjustment.*

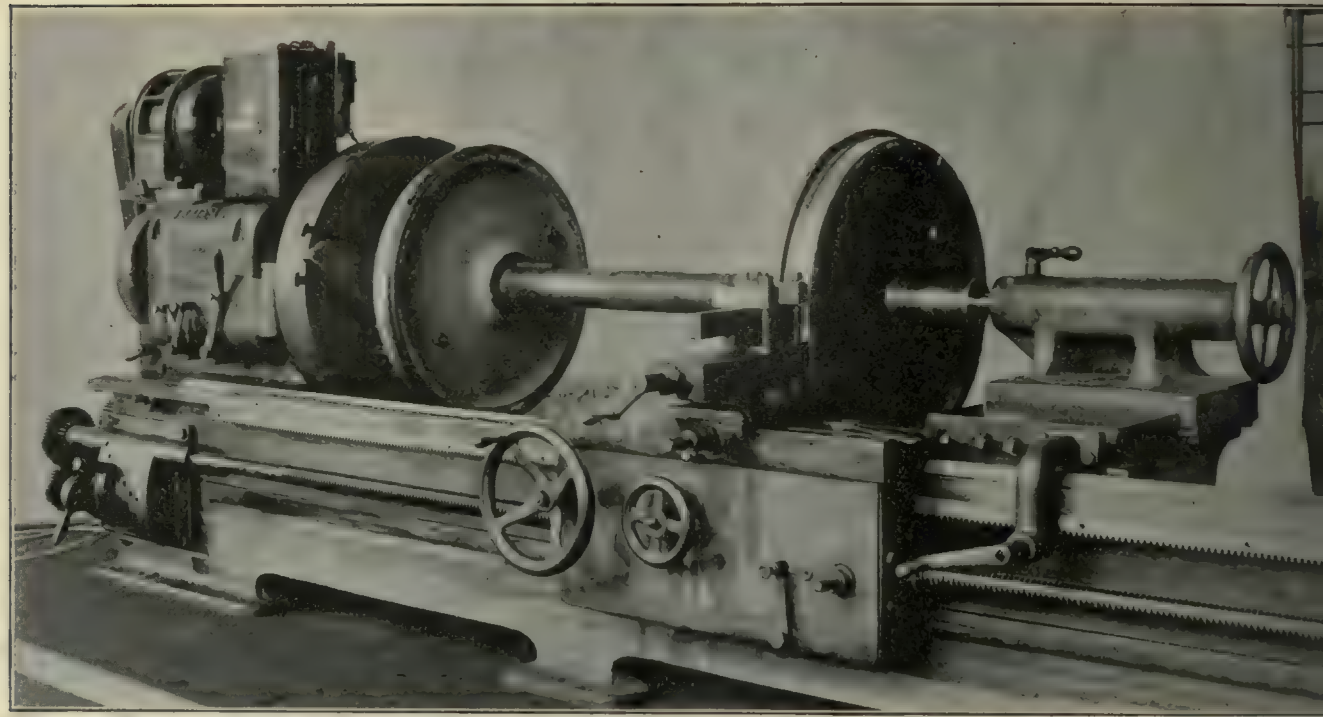
Special tools and dies insure the greatest possible accuracy in the construction of Johnson Change Makers. Production is now sufficient to insure immediate delivery of quantities to meet your requirements.

It will pay you to investigate the time and money saving characteristics of the only adjustable change maker on the market. Write today for complete data and prices.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.

Johnson Change Maker

A McCabe "All-in-1"



Reduces Maintenance Costs

More Wheel Work at Less Cost

No machine will answer better than the "All-in-1". Ample swing, rigidity of bed and carriage, sufficient power, correct cutting speeds and accuracy of adjustment insure the requisite qualities for wheel truing of the finest workmanship and to the closest gage tolerances.

Every master mechanic or shop supt. must now make every machine the shop justify its existence by actual production or make way for machine that will.

To the shop that is limited by floor space or in equipment purchasi power, "All-in-1" Lathes provide a solution of the problem of handli the many diverse jobs both as to diameter and range that are encounter in electric railway maintenance.

McCabe "All-in-1" Lathes appeal to the large shop because they speed production and to the small shop because they are never idle, being equi ped for handling car wheels and tires of the largest diameters, axle commutators and other small work that usually requires several lathe

Right now a maximum amount of work from a minimum of machines a men is absolutely essential to put electric railways back on a firm basi

It is easily seen how the McCabe "All-in-1" lathe fits into this schen when it is considered that our dropped V-bed construction permits t "All-in-1" to swing jobs up to 40 in. The 12 spindle speeds give var ations which supply the correct cutting speeds for any metal or radiu The speed range is 184.2 to 1.6 r.p.m.

If you are trying to cut down on expense and increase production let tell you our shop working plans.

J. J. McCabe Lathe & Machinery Corp

149 Broadway, New York City

GUY ANCHORS

Harpoon Guy Anchors
Hold Fast, Last Long and are Easily Installed

IT is no longer necessary to send out a crew of men to properly guy that pole. One or two men with a sledge and half a dozen Harpoon Guy Anchors can properly guy two poles in the same length of time it would take a crew of men to guy one by old methods.

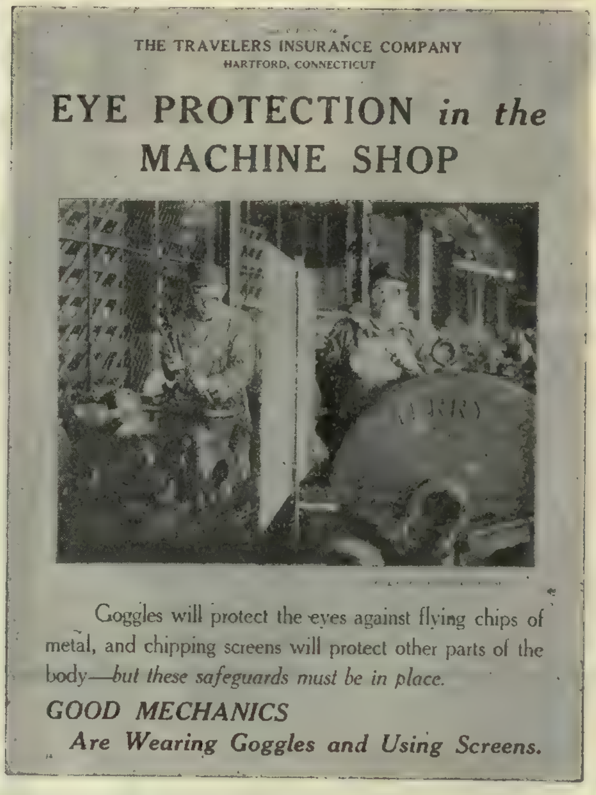
Only a few minutes is required to set a Harpoon Anchor. It has no loose parts to be lost and requires no special tools for installing. An upward pull opens its wings 4½ feet under ground giving it a holding power of over four tons, far more than normal strain requires.

The use of carefully tested steel and hardened driving point insures a proper installation.

Let us mail you an illustrated folder of Harpoon Guy Anchors.

CROUSE-HINDS COMPANY
SYRACUSE, N. Y.
BOSTON NEW YORK CHICAGO
Condulets Panelboards
Knife Switches Floodlights
Guy Anchors
1592

CROUSE-HINDS



THE TRAVELERS INSURANCE COMPANY
HARTFORD, CONNECTICUT

EYE PROTECTION *in the* MACHINE SHOP

Goggles will protect the eyes against flying chips of metal, and chipping screens will protect other parts of the body—*but these safeguards must be in place.*

GOOD MECHANICS
Are Wearing Goggles and Using Screens.

Progressive from Drawing Board to Shipping Room

Travelers' Tower 513 feet high. The tallest building in New England.

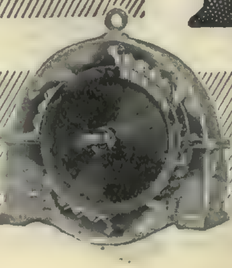
A GOOD example of Terry progressiveness is shown in the above Safety Bulletin which was issued by The Travelers Insurance Co. It shows one more way in which the Terry is setting the standard of good workmanship.

This is typical of the spirit existing in every department from the drafting room to the shipping room of striving for safer and more efficient methods of producing a safer and more efficient steam turbine.

-728

THE TERRY TURBINE

Offices in Principal Cities
in U.S.A. also in Important
Industrial Foreign Countries



The Terry Steam Turbine Co.
Terry Sq. Hartford, Conn. U.S.A.

TULC reduces wear and strain on axles and journals

The use of Tulc as a lubricant insures the most satisfactory and economical operation of electric cars of every type and reduces repairs to a minimum.

It is not necessary to lubricate with Tulc as often as with ordinary oils because Tulc feeds only in sufficient quantity to lubricate properly without loss due to excessive dripping. Where Tulc is used, the wear and strain on armature and axle bearings and journals is reduced to a minimum and their life and usefulness are extended over a much longer period. Hot boxes and cut axles are practically unknown.

Tulc is fully described in our latest Booklet "Results." A copy will be mailed free, upon request.

"Overall Specialists"

The service men who work with you on your lubricating problems are not "experts on theories." They put on overalls and get right down to brass tacks—pack your cars—show you how and why Tulc should be used. They get results—real money saving results—99 times out of a hundred. The hundredth time there is no charge for the service.

***The* The Universal Lubricating Co.**

Offices: Schofield Bldg. **Works: Sweeney Ave.**
Cleveland, Ohio

TULC
A
LUBRICANT

—scientifically and accurately compounded to reduce lubricating costs

Watch
the Details
of Equipment
of
Important
Car
Orders
and
You'll see
H-B
Life-Guards
Specified

H-B Life-Guards Score Hit in Detroit

Twenty-five safeties put in operation on Feb. 1 1921 by the Detroit Municipal Railway are completely equipped with H-B Life Guards.

This essential feature of every real honest-to-goodness safety car often pays for itself within an hour by preventing a front end accident and a subsequent damage suit which often results in a large claim.

H-B Life Guards prevent fatal front-end accidents. The pedestrian may fall under the car but the wheels will not touch him.

H-B Life Guards operate automatically—that is why they never fail. They can be depended upon to operate instantly.

Guard against damage claims. Protect the public and protect yourself—NOW.

The Consolidated Car Fender Co.
Providence, R. I.

Wendell & MacDuffie Co.
General Sales Agents
61 Broadway, New York City

RICO
COASTING RECORDERS

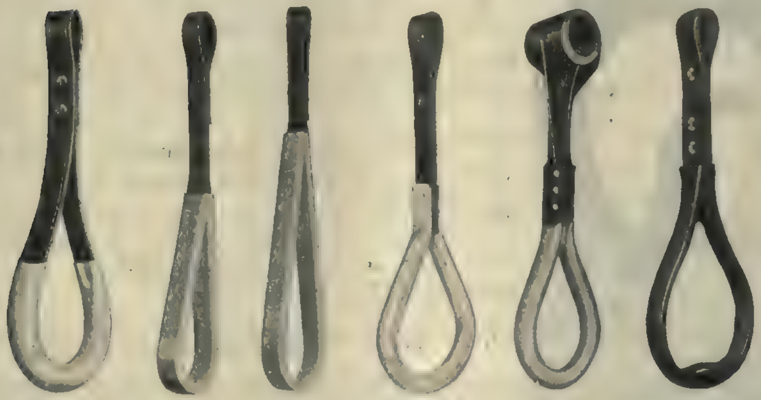
are in use on more than

TEN THOUSAND CARS

saving hundreds of thousands of dollars annually on electric railways throughout the country in all classes of service—standard for over ten years.

Teach your motormen to coast and see that they do it. You will save a lot of money and improve your car operation.

RICO SANITARY STRAPS



Supply a much-needed improvement to your cars.

RICO ANTI-CLIMBERS

Standard bumper insurance against collision damage.

RAILWAY IMPROVEMENT CO. RICO 61 BROADWAY, NEW YORK

Mishaps Like This Belong to Yesterday
Modernize Your Current-Collection with

The Miller Trolley Shoe

The comedy—(which sometimes narrowly escapes being a tragedy) of the jumping trolley pole, doesn't fit in with efficient electric railway operation. The trolley wheel, with all its damages to overhead, schedules and your peace of mind—can't justify itself in contrast with the trouble-proof Miller Trolley Shoe.

Its three-inch area of *constant contact* provides an unshakeable grip on the line—no sparking, no jumping, even at mile-a-minute speed. Hence broken poles, smashed overhead, and damaged roofs are crossed off your books.

While you can reduce your tension you can get increased voltage. Traffic interruptions due to dewirement are eliminated.

These are a few of the reasons why scores of electric railways are using the Miller Shoe. We want you to consider its advantages to your own line. Write us.

Miller Trolley Shoe Co.
West Newton, Mass.

SPECIAL REPRESENTATIVE: Holden & White, Inc., Chicago
EASTERN REPRESENTATIVE: National Railway Appliance Co., New York

SALES REPRESENTATIVES:

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The World's best Lubricants

G A QUALITY L E N A

Telling something you already know

The great majority of the electric railways of the United States are using Galena Oils and Galena Service for car and power house lubrication.

These railways specify Galena products for one reason only—because they have proven their superiority in the tests of actual service.

This company *specializes* in the business of railway lubrication. It is not a *side line.* Galena Oils are built especially for railway work, each grade for a specific purpose. They are the result of years of painstaking test and study, given by practical mechanical men who know the requirements of the service.

Quality is the foundation stone of Galena business—quality in oils and quality in service. Galena Oils are the recognized quality standard for railway lubrication, everywhere. As representatives of the oldest and largest lubrication organization in the world, Galena Service is in constant touch with the latest developments in railway work, and is further perfecting efficiency in the scientific lubrication methods that have already proved a most valuable aid to the railways in producing improved operation.

Therefore, the ever-increasing demand for Galena lubricants is but an honest tribute to merit daily exemplified by incomparable performance on the railways of the East, West, North and South.

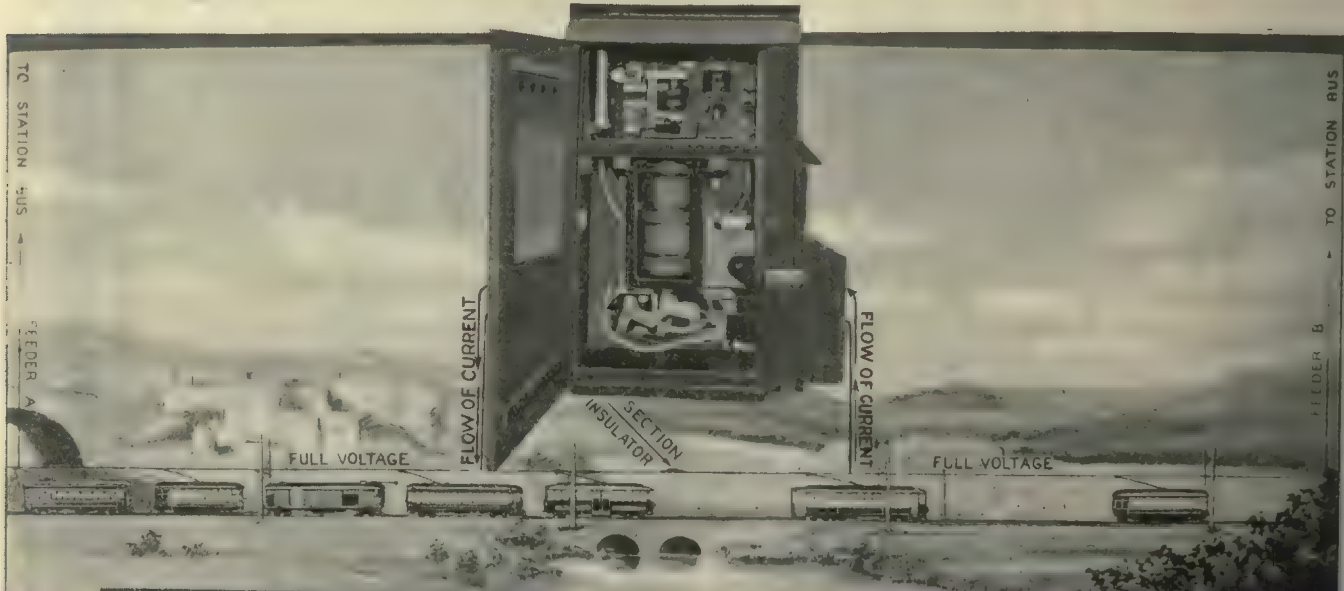
When Galena Service Goes In
Lubrication Troubles Go Out!

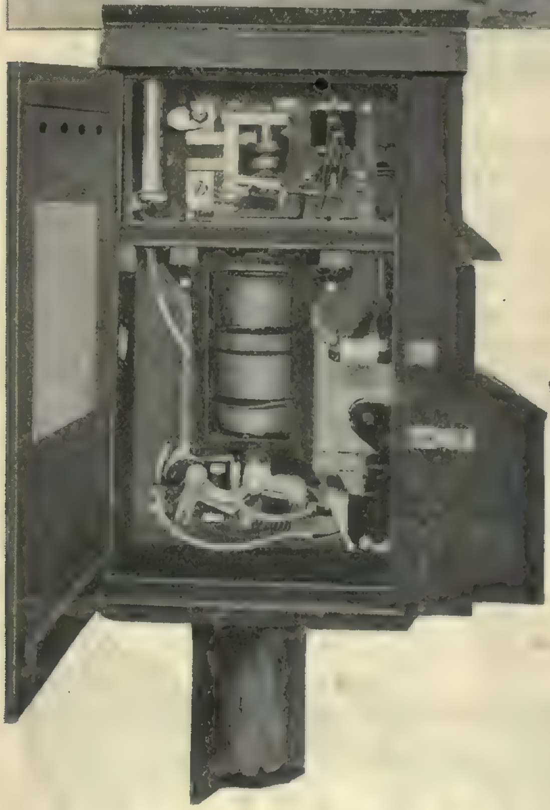
TRIGRAM G S O C TRADE MARK

THE GALENA-SIGNAL OIL CO.
NEW YORK FRANKLIN, PA. CHICAGO
Offices in all principal American Cities
LONDON BUENOS AIRES PARIS

GALENA SERVICE

There is real economy for street railways in a device which not only reduces material costs but makes present feeders more serviceable





Higher Voltage
More Speed
Less Copper

The G-E Automatic Sectionalizing Switch saves feeder costs by reducing the number of feeders along the line, improving the efficiency of existing feeder systems and permitting the use of smaller feed wire.

When a short circuit occurs the switch automatically isolates the affected section. In case of an overload in one section the power is equalized from other sections.

This G-E switch may be conveniently hung on a pole. It is accurately calibrated, tripping positively at the load for which it is set.

Bulletin 54726.2 gives full information—write for it.

General Electric Company

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Schenectady, N.Y.

Sales Offices in
all large cities

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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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olume 57 New York, Saturday, April 16, 1921 *Number* 16

Franchise Is Not Always a Contract

THE decision just rendered by the United States Supreme Court in the case of the San Antonio Public ervice Company should help materially to clarify the ituation in regard to the power of cities in Texas over he rates of fare of the local railway companies. The ull printed decision of the court is not available at the resent time, but digests received from Washington ndicate some of the facts. Briefly, it might be said that he court affirmed a decree of the Texas District Court njoining the city of San Antonio from requiring the ompany to carry passengers for 5 cents, with universal ransfers, as called for in the company's franchise.

In its decision the court analyzes the franchise of the ompany and the conditions under which it was granted nd whether the two parties thereto had the independent tatus which would bind each, and it finds that this is ot the case with the city, because of a provision exist- ng in the State constitution at the time that the fran- hise was granted prohibiting any city from making any irrevocable or uncontrollable grants of special rivileges, etc." In these circumstances the court, as in revious cases of a similar kind which have come be- ore it, declared the company was not bound by the rates pecified in the franchise but could charge a reasonable ate.

It is difficult to determine the effect which the de- ision will have on rate cases elsewhere, but at least t seems to sustain the idea of the dependency of the city n the State for power to make franchise contracts with ublic utility companies and also the right of the com- any to charge a reasonable rate when there is no fran- hise or when the city does not have the power to enter nto an agreement specifying an irrevocable or uncon- rollable rate.

ow Can the Efficiency of the Shop Personnel Be Increased?

ALL admit that the efficiency of the various working forces required in electric railway maintenance eteriorated to a considerable extent during the war eriod when labor was at a premium. Those in charge f the work had to take whatever labor they could get nd be satisfied with it. If this waste in efficiency could e computed in dollars and cents it would astound most f us, and the bringing back of this efficiency is a esult which is needed today perhaps more than nything else.

The efficiency of any body of men depends to a large xtent on the manner in which it is directed. A apable and efficient foreman can do much toward ncreasing the spirit of co-operation and toward toning p the entire working organization. The selection of oremen should not be left to chance, but the most ficient workmen should be trained to fill vacancies henever they occur. Of course the most capable work- en do not always make the best foremen, but if a promising employee has a chance actually to direct the work in the capacity of acting foreman when it becomes necessary for the regular foreman to be absent, a general idea can be formed as to the man's ability to develop team work and to inspire methods that will produce results.

Another thing that is sure to produce efficiency in an organization is the use of a piecework system. A piecework basis is not easy to establish in electric railway work, but some of the large roads have introduced this in a number of their departments with marked success. A piecework basis is also much easier to establish on a large railway property than on a small one, as there are more operations which are similar occurring continually, and unless there is enough of the same or similar work being done the establishment of a piecework basis is almost impossible. Thus, take the various steps in the dismantling and rewinding of an armature. The work and time necessary for stripping similar armatures is almost identical, and this could be readily placed on a piecework basis, but unless there is enough of this work to keep a man almost continually employed the efficiency resulting from familiarity in doing the same class of work is lost. This is an opportune time for railways to analyze their needs and introduce practices that will produce results.

The American Engineering Standards Committee a Going Concern

THE forthcoming annual report of the American Engineering Standards Committee contains evidence that the organization is functioning, and that it has secured the allegiance of enough national engineering bodies to give ponderable weight to its stamp of approval.

It will be worth a great deal to the country's industries, in the way of conservation of material resources and mental energy, thus to have a clearing house for engineering standards and a co-ordinating force tending to rationalize these standards. Various branches of industry have been struggling, largely alone, to save themselves money and effort through standardization. This is illustrated by the standardization work of the American Electric Railway Engineering Association, which centralizes in its committee on standards. A large part of the work of the several committees of this association has to do with standardization. In spots this overlaps and hence partially duplicates the similar work of other associations. Consequently when the plan and scope of the A. E. S. C. were put before the executive committee of the Engineering Association, a request for enrollment was promptly forwarded to the parent American Association, which in due course enrolled. It now heads the list of members (in alphabetical order), which typographical position it is hoped may be symbolic of a leading part in the Standards Committee activities.

When one considers the vast sums which have been spent in joint committee meetings representing interests which have desired to get together on standardization matters, he cannot but realize that the American Engineering Standards Committee has a real field for its operations. A careful reading of the abstract of the annual report, which is given elsewhere in this issue, will convince even the skeptical that constructive work in this field is actually being done. For its financial support the committee will have to appeal outside of its membership dues, but funds will be forthcoming as soon as the results shall have shown themselves to be immediately or potentially profitable to industry. It is now up to the electric railways and other supporters of the national movement to make use of the results already achieved and to use the committee's facilities to expedite their own standardization plans.

Don't Be Too Mechanical in Rating Men

ON ELECTRIC railway properties, as with all corporations employing large numbers of men, the tendency is toward careful organization of the personnel. This is right and necessary if the best results are to be secured from the large expenditure for labor and administrative talent. On the other hand, system is not good if it is permitted to take the place of that personal contact and human interest which is the basis of first-class organization.

The danger of over-systematization is not only that the relations of men and supervisory officers may become mechanical and hence inefficient, but also that the real qualities of men may not be appreciated. An example of this, which in fact provoked the present comment, came to light recently. It developed that a certain electric railway department head who has now achieved an unusually good reputation for getting things done and done well was formerly employed in an organization in which the men were carefully "card catalogued." This man's record card bore the significant legend, "N. G., Do not rehire." The trouble in this case was simply "too much system." Superficial qualities here apparently had been used as a basis of rating, with the resulting anomalous and false estimate of the real worth of the man, or the wrong label may even have been attached to his record.

The incident just mentioned is quoted to indicate a danger in organization and not to ridicule systems of classification, including those employing the ubiquitous and highly useful card catalog. Not at all! Only the card catalog and the clerical staff behind it cannot be expected to serve as more than mere recorders. They cannot put in the personal touch.

Surface Trunk Lines Make for Speedier Service

IN MOST cities practice has decreed that all routes from the various outlying corners of the city converge at some downtown central point. In order to get the cars through the center of the city with a minimum of delay to the traveling public, through routes are operated connecting the various parts of the city where investigation has proved that there is a large traffic interchange. This plan has developed routes of considerable length. It brings up the question, is there a limit today to the length of urban route that can be operated so as to give adequate service?

Lately much has been said about distributing center for l.c.l. freight, and this suggests that the ide embodied in the l.c.l center can be applied with advar tage to many urban passenger transportation system if passengers will pardon the comparison of themselve for this purpose only, to l.c.l. package freight. Th plan has been recommended in several places in the pa for handling what might be termed "the neck of th bottle" traffic.

In Cleveland surface trunk line operation has onl recently been suggested as a means of improving th transportation facilities to the northeast factory di trict. At present all routes serving this section vary length from 9.6 to 10.6 miles and loop at the publ square for the return trip. The routes are becomin so long, however, due to periodic extensions, that it becoming more and more difficult to maintain the prop scheduled speed. The plan calls for trunk lines opera ing multiple-unit trains to specific distributing poin in the heart of the district served. Such operatio makes short routes from the distributing points the outlying residential districts—routes that can operated with lighter and smaller capacity equipme on headways determinable only by the traffic origina ing on each outlying route. Trunk line service c then operate on two bases, either with an all-day fix headway, with the length of trains varying with th traffic demands, or with service of two or three-c multiple-unit trains running on shorter headway durin the rush hours.

Motor Trucking Not Yet a Science

THE discussion at the March meeting of the Ne York Electric Railway Association covering electr freight and express indicates pretty clearly that all not well when motor trucking is done at less than co To get at the facts of the situation one need only ming a bit with the motor truckers themselves and list to stories which are related, from cheerlessness only, the pious hope that steam railroads will continue seek higher rates for slower service and thus indirect give the trucks a chance.

In the congestion and embargo days of the war a shortly thereafter motor trucking went through all t mushroomlike growths made so familiar by the pa senger jitney. Any man with $500 or so had a doz salesmen on his doorstep ready to sell him a truck a year or two years' time and then to guarantee hi business to boot. For a time all went well. There w no trouble in getting full loads going and coming a at any price a desperate shipper would pay. Yet lo before the present depression, the less experienced mot truckers began to fall by the wayside—this period co ing when it was necessary to put the truck through first overhaul. Then the operator discovered that su a thing as "repairs"—not to name the remoter "dep ciation" and "interest on investment"—had to be figur into costs.

Today, with 300,000 idle freight cars and no hur calls for materials, the best of motor truckers are their wits' ends. Traffic at their rates has dropped one-fourth or less of the old days, but the overhead g on remorselessly.

Where there is a chance for the truck to serve bett than the rail the motor trucker by profession, *i.e.*, t common carrier, finds the ground cut from under h y the so-called occupational truckman. For example, fruit dealer running empty one way will call up ship ers and offer to take loads into town for any old price. n his return trip, carrying only his own wares to apacity, he is not interested in soliciting business. here is such an amazing amount of this sort of thing, esides the competition of one-truck operators who are eating up their trucks," that the only way out is ecognized to be the placing of the motor truck on the ame basis of regulation as a railway. This is not the lace to argue why, but it is safe to say that this desired egulation of motor trucks is one of the logical steps oward placing all freight carriage in a district under ne transportation head that can and will find the way secure the constructive co-ordination instead of the estructive competition of essential transportation edia.

e Who Writes Specifications Should Know Materials

F SPECIFICATIONS for electric railway supplies are to be prepared intelligently the framers thereof ust be somewhat expert regarding the materials which ey specify. This is particularly true regarding wood, teel, copper, zinc, tin and alloys, insulating material, ood and paint. Even where standard specifications are tilized it is desirable that they be used with full nowledge of the characteristics of the materials in olved. Unfortunately for manufacturers and purchas rs, the ideal in this direction is not yet reached, and npossible, impracticable or uneconomical designs, di ensions and strengths are frequently demanded by ose who write the specifications.

To ameliorate this condition the editors of this paper ore than a year ago arranged with Norman Litchfield prepare a series of articles on electric railway ma erials, particularly those mentioned above. His experi nce, both as a railway engineer and an engineer with car building company, combined with a thorough tech ical training, gave him an excellent background for is task. His first article appeared in the mechanical nd engineering number for Feb. 21, 1920, and the con uding article, on insulating materials, appears this eek. Taken as a whole this series forms a notable ontribution to the subject overed, because the author as not only gathered to ether the recommendations f the several engineering ssociations as to the char cteristics of materials and e fundamental data relat g thereto, but has blended is own observations and eductions therewith.

Now that the series is omplete, the articles should e reviewed by electric rail ay engineers; they should e recommended for study ambitious young men in e technical departments; ey should be consulted hen new specifications are eing drawn up or old ones evised; and they should e reread by purchasing agents who are responsible to a considerable degree for the qualities of supplies which are purchased. There is danger that good reference text like this may be examined approvingly but filed away and forgotten. It does not deserve such a fate, nor is it economical for the railways to allow such a fate to overtake it.

What if There Is No Exhibit This Year?

BY THE TIME this line meets the reader's eye, a decision will presumably have been reached and announced by the executive committee of the American Electric Railway Association as to the holding of an exhibit in connection with the annual fall convention. If the decision is favorable, there is no doubt that the supply men will pitch in with a will to make it the best exhibit in the series. If, however, it has been deemed expedient to postpone the exhibit for a year, as many members believe should be done, there will arise a new query, namely, as to the best location for the meeting. A few reflections based on the no-exhibit contingency cannot be considered academic in view of the circumstances.

Going to Atlantic City for conventions has become a habit with many organizations, including the American Electric Railway Association, partly if not largely because the "Million Dollar" Pier there furnishes a unique and well-arranged structure for a combined meeting and exhibit. There are numerous cities which are supplied with excellent hotels, meeting places and exhibit halls, but there is none which can meet the need for a combination of the three to equal Atlantic City.

When an electric railway convention without an exhibit is to be held the pre-eminence of Atlantic City as a meeting place disappears. There are many reasons for going elsewhere, not the least of which is minimizing of traveling expense. There is some point on the map for which the sum total of this item should be a minimum. The mathematically inclined could figure this out, given the necessary data. Everything else being equal, a convention site somewhere near the "center of gravity" would be highly desirable. Then, again, if the meeting place "happened" to be one where a well-arranged railway was the joy of the local populace, an opportunity would be appreciated for getting some good points on construction, operation and maintenance, as was pointed out in an editorial last week. In other words, the system would be an exhibit.

A byproduct of a meeting in an electric railway center would be the impression created therein by the gathering of representative transportation men. Undoubtedly a good convention without exhibits could be held at Atlantic City, but the additional advantages already mentioned possessed by a mid-Western city like Chicago, Indianapolis or Cleveland are worth consideration.

Quotation from the Federal Electric Railways Commission Report

No. 16

THE original failure of the electric railways to vary their rates of fare for transportation service, based upon the length of the ride, as services in all other lines of business are sold, is, in our judgment, one of the contributing factors to their present financial condition. The electric railway industry is the only public utility which, as an industry, has consistently adhered to a flat basis. Steam and suburban roads charge on a distance basis. Gas, power, electric and water power companies, generally, make their rates upon a measured basis, subject to a minimum charge per month, and the telephone company grades all toll messages on a mileage basis, while observing in most cases a flat rate per month for local service. Whether or not under present conditions it would be to the interest of a community to introduce a zone system of fares, instead of the present flat fare system, is a question which we think should be decided by the community itself, having reference to the social problems involved.

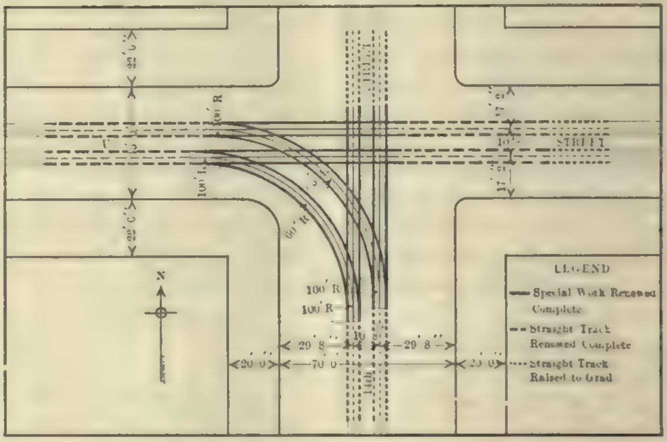
Large Special Trackwork Renewal

The Entire Layout at Fourteenth and U Streets, N. W., Washington, D. C., Was Renewed and Additi Special Work Was Installed by the Capital Traction Company Without Interfering with the Regular Operation — The Surface Work Was Set Up on an Adjacent Lot Before Installation to Insure Rapid Assembling

By E. P. GOUCHER
Assistant Engineer Capital Traction Company, Washington, D. C.

THE Capital Traction Company, Washington, D. C., recently completed a renewal of the entire special trackwork layout at Fourteenth and U Streets, N. W., which, as shown in the accompanying diagram, consists of a double-track crossing and a double-track connected branch-off shown in heavy lines. In addition to the special trackwork, 231.15 feet of single track on U Street was completely rebuilt, as shown by dash lines, and 133 feet of single track on Fourteenth Street and 68 feet on U Street was raised to a new grade, as shown by dotted lines. The entire job was of the underground conduit type of construction used exclusively in Washington.

This street intersection is one of the busiest in the city as regards traffic, both car and vehicular, especially during the morning and afternoon rush hours. It was therefore of extreme importance that the work be completed as quickly as possible. Every effort was made to this end, and as a result the job was completed, including all paving, in sixty-six working days.



SPECIAL TRACKWORK RENEWAL IN WASHINGTON, D. C.

The special trackwork was furnished by the Lorain Steel Company, being fabricated from dimensions and angles obtained by a careful survey of the site. The special surface work is of cast steel throughout, with the exception of a few rolled rails in the connecting curves and tangents. All the wheel frogs are made with renewable cast manganese steel center plates. All the yokes, gussets, etc., composing the substructure are of gray cast iron with machined surfaces to receive the surface work.

The outside curve (the one nearer the crossing) was relocated to give more clearance between cars passing on the curves, the balance of the layout remaining practically the same as the previously existing work. The new material was hauled to a large vacant lot one block from the job, and there the surface work was set up complete in the same relative position in which it was to go in the street, as shown in one of the accompanying photographs. Measurements were taken to permit the cutting of the existing work to suit the new; conductor bars were bent, cut and bonded, and make-up rails were cut and drilled. All make-up rails and compromise plates were numbered to facilitate installation work at night.

The removal of the old concrete and steel substructure on renewal jobs of this type of construction is the most difficult part of the work, especially at suc intersection as that at Fourteenth and U Streets, w the car traffic is very heavy. At the time this job under way an average of 725 cars passed on the F teenth Street tracks, 492 on the U Street tracks 107 went around the curves during the eight- period in which the gangs were working, making a of 1,324 cars in all directions, or one about e twenty-two seconds. During the rush hours in morning it was neces practically to suspend work on the street. starting work at 6:30 a however, the evening r was avoided.

Pneumatic tie tam equipped with chisel were used in removing old pavement. Holes w then drilled through paving base and the c crete tube, using pneum drills with 1½-in. bits, the greater part of the c crete was broken away w bull points and 16 sledges. The concrete maining on the old yo and castings was removed with chisel-bit tie tamp Pneumatic tools operated by efficient labor and in cha of a foreman who understands his job are almost in pensable on work of this kind.

As excavation progressed, vertical 6-in. x 6-in. t bers were placed under the old rails and castings wedged tightly in place, and as soon as a section completely excavated and ready for the new spe trackwork a concrete slab or "floor" about 6 in. or 8 thick was poured so as to clear the bottoms of the de

DETAIL COSTS OF LABOR AND MATERIAL

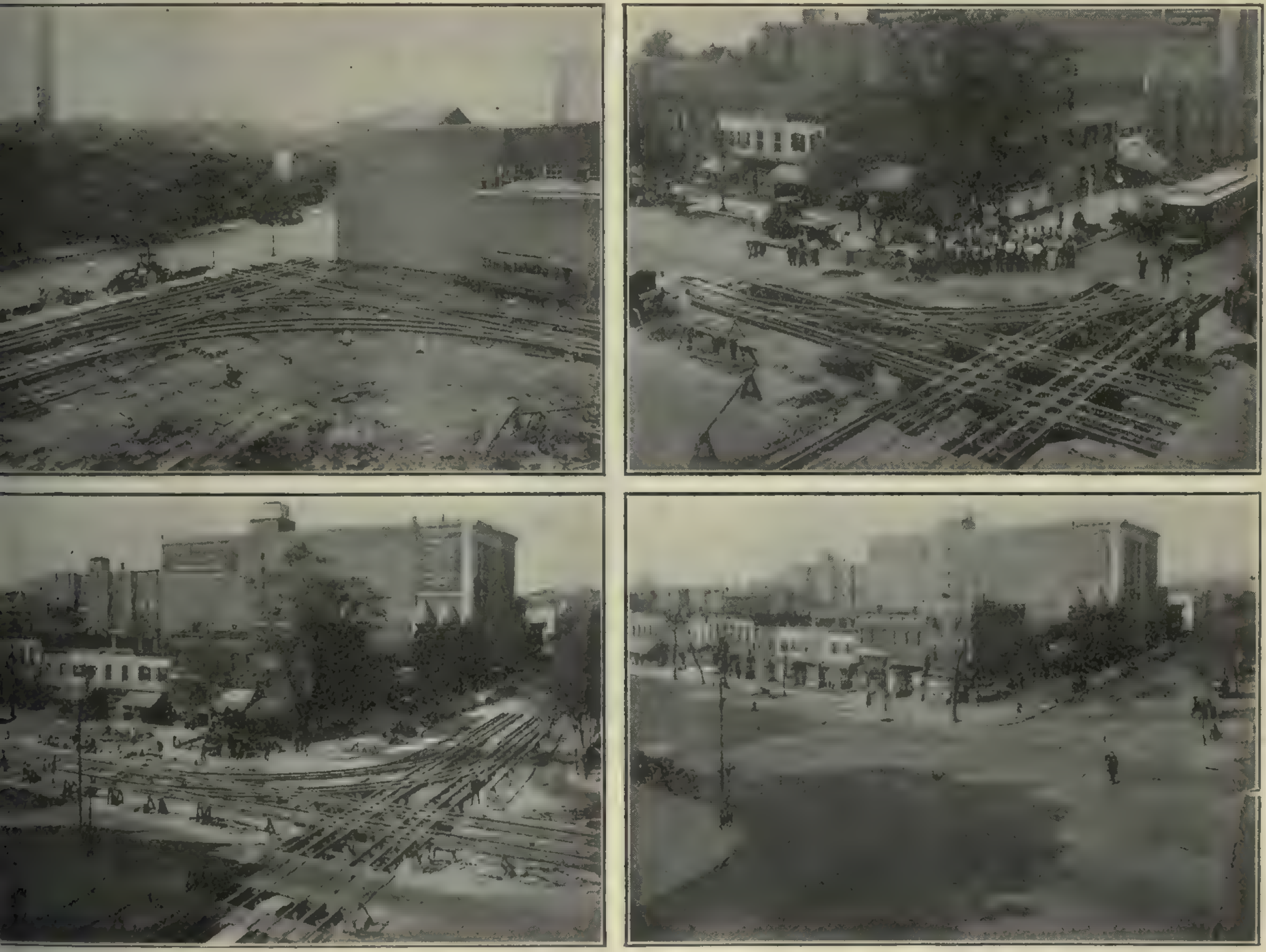
Class of Work	Labor and Hauling	Material	Tot
Engineering and superintendence	$648.71	$67.39	$71
Excavation	5,814.08	....	5.81
Special trackwork	....	42,415.00	42.41
Steel work at night	1,625.07	....	1,62
All other steel work	2,307.21	1,313 90	3,62
Form work	1,460.24	386.53	1,84
Concrete tube construction	759.37	1,927.28	2,68
Conductor bar	500 49	1,080.94	1,58
Paving base	203.63	351.63	55
Track drains	276.70	81 05	35
Watchmen, tools and sundries	2,681.82	444 09	3,12
Paving	452.98	616 94	1,06
Raising Fourteenth Street tracks	1,615.55	542.50	2,15
Underground obstructions	22 73	72 22	9
Gross total cost	$18,368.58	$49,299.47	$67,66
Credit from scrap, including cost of handling	132.51	1,703.19	1,57
Net total cost of special trackwork	$18,501.09	$47,596.28	$66,09
Rebuilding 231.15 ft. on U Street, including raising tracks on U Street	4,883 84	2,625.20	7,50
Total cost of entire job	$23,384.93	$50,221.48	$73,60

of the new yokes. This necessitated the complete removal of some of the old yokes before the placing of concrete, as many of the old yokes were deeper than new ones to be installed. Forms about 12 in. square e placed around the bottoms of the supporting tim- s. The level pouring of this floor greatly facilitated setting up of the new yokes during installation work night and also served as a spread footing under the ire job.

t was necessary to install the new work in three ions. The crossing was installed first, the outside ve, including both branch-offs and both curved cross- s, next and the inside curve and branch-offs last. As our installation work has to be done between 1 and .m., it may readily be seen that the installation of outside curve was quite an undertaking for one nt. This was necessary, however, because of the cation of this curve, as mentioned before. But due he splitting up of the gangs and their distribution the entire curve no difficulty was experienced and first car went over on schedule time, three hours and ty-seven minutes after the removal of the old ial trackwork was started. Car traffic was not de- d at any time during the progress of the job, with exception of two or three minutes' delay due to ping of cars on cut-outs.

ight work was greatly facilitated by the preliminary ey work of the company's engineers. Every yoke gusset was "tied" out by offset nails in the asphalt street and grade stakes were set on the "floor" of the excavation at the exact elevation of the bottoms of the new yokes. After the old special trackwork had been removed and the "hole" cleaned out, the new yokes were placed in almost their exact locations by means of a chalk line and tape used in connection with the offset nails. They were then wedged up to the grade of the stakes. As the new yokes were of different depths and the floor was level it was necessary in some places to lay pieces of old girder rail on the "floor" upon which to set the new shallow yokes. These rails were placed to the proper grade, so that it was necessary only to set the yokes to line.

The new work, also supported by the 6-in. x 6-in. timbers placed under the wheel rails, was surfaced and lined as quickly as possible after installation, the grades were checked by the District Engineer Department and concrete was poured around the bottoms of the yokes and gussets. This "sticking," as we call it, is to hold the new special trackwork in position while forms are placed for the conduit construction and the concrete conduit is poured. It is one of the most important phases of the work. The entire weight of the new steel and heavily loaded cars must be carried by the timbering and vibration reduced to a minimum, in order to prevent the yokes "working" while this concrete is setting. Several men with hammers and wedges watch the timbering and at the slightest sign of movement in the rails or yokes tighten the wedges at the proper



TOP, LEFT, SURFACE WORK SET UP ON LOT PRIOR TO INSTALLATION. AT TOP, RIGHT, EXCAVATION IN STREET UST BEFORE INSTALLATION OF NEW CROSSING. AT BOTTOM, LEFT, NEW SPECIAL TRACKWORK COMPLETELY INSTALLED. AT BOTTOM, RIGHT, ALL WORK COMPLETED, INCLUDING PAVING point, or place another upright and wedge it securely in place.

Construction of the formwork for the conduit construction on a renewal job of this kind is a very tedious job, as conditions prevent the standardization of forms to any extent, thus requiring special forms almost entirely. The underground conduit or "tube" construction on the special trackwork only of this job required approximately 233 cu.yd. of 1:2.5:4.5 concrete which cost $8.15 per cubic yard for material and $3.26 for mixing and placing. The forms for this concrete cost on an average of $7.92 per cubic yard of finished concrete, $6.13 of which was for labor. The excessive cost of concrete material as indicated by these figures was due to a cement shortage which occurred at the time this job was under way.

The new paving installed consisted of Durax granite block in the larger areas, with Kreolite wood block in and around the switch and crossing castings. Paving outside the rails was Scoria block laid as headers, with sheet asphalt outside. A total of 680 sq.yd. of new paving was installed. All the block paving was laid on a 1:4 cement and sand cushion 1 in. thick, with pitch as a filler.

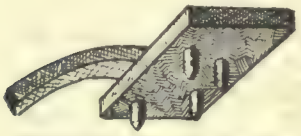
This special trackwork layout was originally installed complete in 1899. In 1910 it was necessary to renew the surface work only of the double-track crossing, but the balance of the surface work and all of the substructure removed in 1920 was part of the original installation, which had been in service under heavy traffic for about twenty-one years. This is rather a long life for special trackwork of this underground type of construction. The original work and also the crossing renewal were furnished by the Lorain Steel Company.

The original installation in 1899 cost about $9,020 complete, $6,100 of this being the cost of the special trackwork only. The surface renewal of the crossing in 1910 cost about $4,058, of which about $3,200 was for the special trackwork.

The accompanying summary shown on the preceding page gives the costs of the 1920 renewal complete by labor and material on the different classes of work for a total length rebuilt in the special trackwork of 535.23 ft. single track.

Cant Hook for Concrete Poles

THE ordinary cant hook used for wooden poles is not only decidedly unhandy on concrete ones but also is even dangerous to use. The single prong often chips out a large piece and has occasionally caused the ruin of a new pole. To obviate this disadvantage, according to an article published in the January bulletin of the Utilities Mutual Protection Company, a new type of hook with a special foot has been developed. This has four teeth set into the face plate in the manner shown in the accompanying cut. By increasing the points of contact and extending the strain on the concrete over a distance of about 6 in., this device will handle even the softest "green" pole without damage and without risk of dropping the concrete pole unexpectedly.



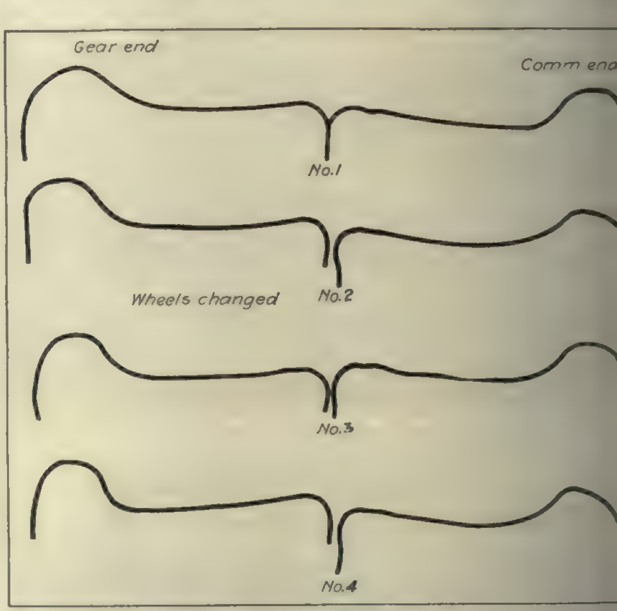
STUDDED FACE PLATE FOR A CANT HOOK

The hook is the invention of Mr. Jennyjohn of the Rochester Gas & Electric Corporation.

Testing Wheels for Flange Contour

A CAREFUL check-up on all cars involved in der
ments on the Chicago Surface Lines has b
inaugurated by H. H. Adams, superintendent of equ
ment, with a very good result as to the number of s
causes of delay. Whenever a derailment occurs
car crew reports the incident to the company swit
board operator and a daily report of all such derailme
occurring over the entire system and giving the ti
place, nature of the accident, etc., is made up
copies sent to the track, transportation and equipm
departments. The carhouse foremen are called fr
the equipment superintendent's office each day
asked to report on the condition of the wheels on
cars involved in the derailments reported.

For making these reports a $\frac{1}{16}$-in. thick lead stri
carefully bent by hand over the wheel tread and fla



INSPECTION REPORT OF WHEEL CONTOUR ON CA
REPORTED DERAILED

in order to get the exact shape of the contour
determine if any of the car wheels were responsible
the derailment. After one of the lead strips is for
over each wheel the eight strips are inked from
ordinary pad and stamped on the report sheet, wher
the contour of each of these wheels is accurately re
duced. If any bad wheels are indicated the fore
notes on the report what he is going to do, if anythi
and forwards the report to the main office of the eq
ment department, through the division master mecha
If the foreman has not ordered a proper or adeq
repair he receives instructions from his superiors.
foreman also inspects the center and side bearings w
he is getting the wheel contours and reports on th

A further step taken in minimizing the derailme
was the plotting on a large map of the city the loca
as reported of all derailments. If these occur in clust
this fact shows up at once and a special investigatio
the situation there follows. Division and system cu
showing the number of derailments are also now be
maintained, and since the new scheme of inspection
started derailments show a decided downward tr
The moral effect of this follow-up is that the fore
are induced to keep a more careful watch of the wh
on the cars under their jurisdiction in order to a
the recording of bad wheel accidents against them.

Maintenance Cost Accounting

System Used by San Francisco-Sacramento Railroad Has Proved Invaluable as Means of Supplying Actual Cost Data from Which to Decide Whether Maintenance of Various Parts of Equipment Is Satisfactorily Carried On in Relation to Road Performance

By E. A. PALMER
Manager Railway Division San Francisco Office, Westinghouse Electric & Manufacturing Company

THE "Sacramento Short Line," formerly known as the Oakland, Antioch & Eastern Railway, operates a heavy traction, high-speed, 1,200-volt, direct-current electric passenger and freight service between San Francisco and Sacramento, California, and intermediate points. The rolling equipment comprises twenty passenger motor cars, weighing approximately 46 tons each, equipped with four Westinghouse 120-hp., 600-1,200-volt motors and type HL multiple-unit control, also six locomotives used mostly in freight service and a number of passenger trailers and standard box cars.*

TYPICAL TRAIN OF SAN FRANCISCO-SACRAMENTO RAILROAD

In 1920 this equipment made 1,616,316 passenger car-miles on the 117.2 miles of track with a total of twenty-six delays, averaging 25.7 minutes, from all causes chargeable to the rolling equipment department. This is at the average rate of 62,166 car-miles of service per detention. The distance between terminals, namely, 90 miles, or 164 train-miles per round trip, from the shop in Oakland, necessitates the highest standard of equipment maintenance possible.

A typical train pulling out of the Oakland station is shown in the headpiece of this article. The schedule speed at which these trains operate is approximately 30 miles an hour, including all stops and slow-downs.

Having in mind the service conditions and the management's requirement that superior time-table performance of equipment, combined with comfort and safety, be furnished the traveling public at a minimum expense, Frank A. Miller, superintendent of power and equipment, undertook in 1914 to install a cost accounting system that would fulfill the following conditions:

1. Conform to the requirements of the Interstate Commerce Commission.
2. Be acceptable to the auditing department of the railroad by accounting for all money disbursed.
3. Furnish accurate segregated cost data for the analysis of the performance of any desired part of equipment for any day, month or year.
4. Totalize the amounts spent progressively either on payroll or material account from the first of each month so that clerical work would not be greatly increased as a whole or at the end of the month.

The system as now in effect, in addition to fulfilling the requirements, has been invaluable as a means of supplying actual cost data with which to decide whether the maintenance of various parts of the equipment is being satisfactorily carried on in relation to the road performance. The basis of segregation of all charges for labor and material which are expended in equipment maintenance is a blueprint schedule entitled "Shop Order Numbers," as shown. The list contains fifty-three main headings, which in turn are itemized into the details upon which specific costs are desired. Each item is given a Shop Order Number, the first two digits of which correspond to the Interstate Commerce Commission account, to which the expense is chargeable. The last two digits give the index to the subaccount. This chart has three features which should be noted:

1. There is a "Shop Order Number" on the chart to which every dollar spent on the annual maintenance budget may be segregated.
2. There are no non-specific "Miscellaneous" Shop Order Numbers to which it is possible to charge expenditures otherwise apparently unaccounted for on the chart. The account numbers under the "Miscellaneous" headings cover definite items on which costs are desired such as —"1,301, Repair to Underpass Pump" or "7,804, Repair to County Tunnel Lights."
3. There are no car or car series numbers on the chart. Costs are kept by parts and types of equipment and the various operations on the same.

A framed copy of the "Shop Order Number" chart is kept in each of the departments of the shop and the

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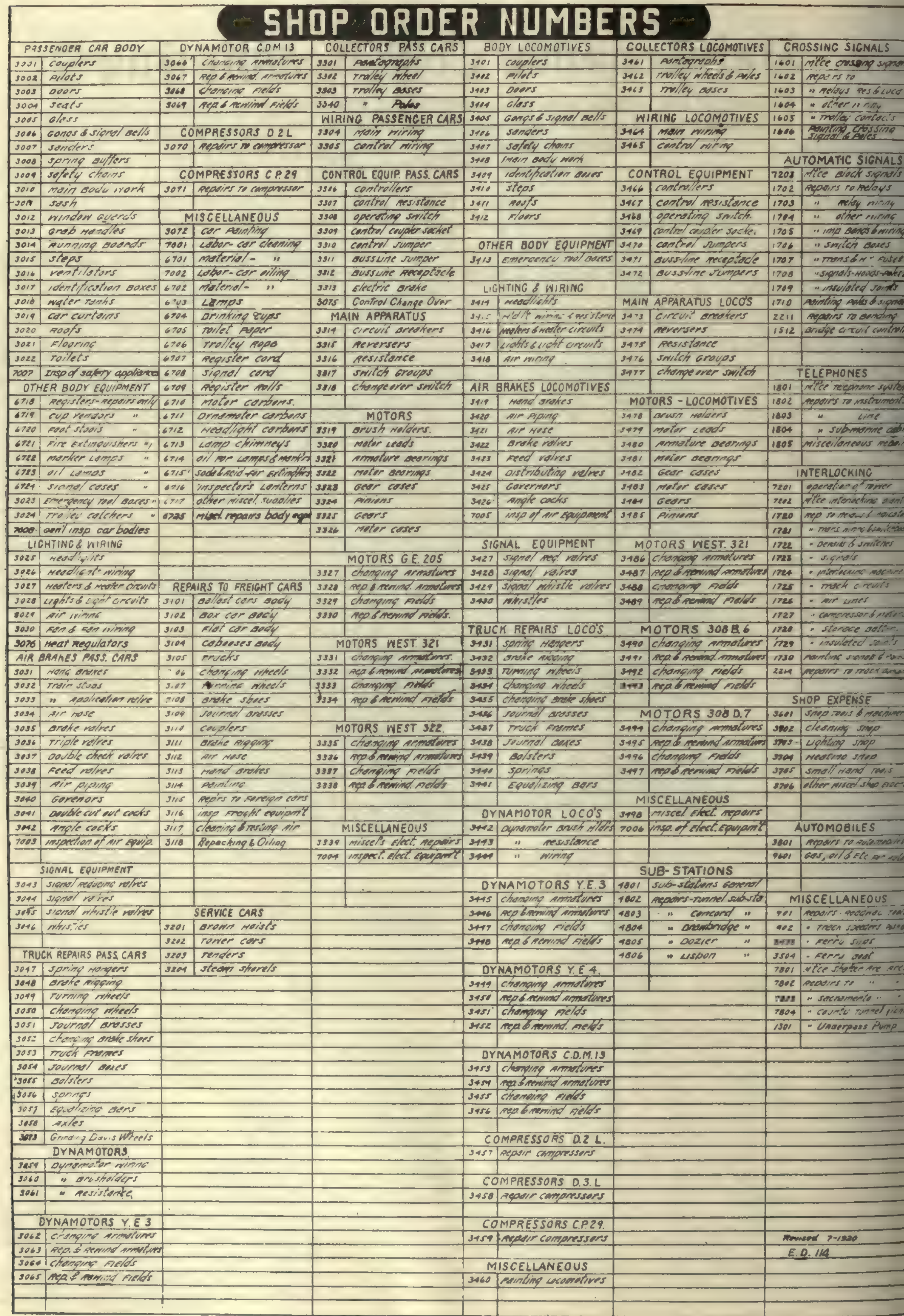
*The characteristics of the Oakland, Antioch & Eastern Railway's cars and equipment were described in the issue of the ELECTRIC RAILWAY JOURNAL for Oct. 11, 1913.



SHOP ORDER NUMBERS

PASSENGER CAR BODY	
3001	couplers
3002	pilots
3003	doors
3004	seats
3005	glass
3006	gongs & signal bells
3007	sanders
3008	spring buffers
3009	safety chains
3010	main body work
3011	sash
3012	window guards
3013	grab handles
3014	running boards
3015	steps
3016	ventilators
3017	identification boxes
3018	water tanks
3019	car curtains
3020	roofs
3021	flooring
3022	toilets
7007	insp of safety appliances

OTHER BODY EQUIPMENT	
6718	registers-repairs only
6719	cup vendors "
6720	foot stools "
6721	fire extinguishers "
6722	marker lamps "
6723	oil lamps "
6724	signal cases "
3023	Emergency tool boxes "
3024	trolley catchers "
7008	gen'l insp. car bodies

LIGHTING & WIRING	
3025	headlights
3026	headlight wiring
3027	heaters & heater circuits
3028	lights & light circuits
3029	air wiring
3030	fan & fan wiring
3076	heat regulators

AIR BRAKES PASS. CARS	
3031	hand brakes
3032	train stops
3033	" application valve
3034	air hose
3035	brake valves
3036	triple valves
3037	double check valves
3038	feed valves
3039	air piping
3040	governors
3041	double cut out cocks
3042	angle cocks
7003	inspection of air equip.

SIGNAL EQUIPMENT	
3043	signal reducing valves
3044	signal valves
3045	signal whistle valves
3046	whistles

TRUCK REPAIRS PASS. CARS	
3047	spring hangers
3048	brake rigging
3049	turning wheels
3050	changing wheels
3051	journal brasses
3052	changing brake shoes
3053	truck frames
3054	journal boxes
3055	bolsters
3056	springs
3057	equalizing bars
3058	axles
3073	Grinding Davis Wheels

DYNAMOTORS	
3059	dynamotor wiring
3060	" brushholders
3061	" resistance

DYNAMOTORS Y. E 3	
3062	changing armatures
3063	rep. & rewind armatures
3064	changing fields
3065	rep. & rewind fields

DYNAMOTOR C.D.M 13	
3066	changing armatures
3067	rep & rewind. armatures
3068	changing fields
3069	rep & rewind fields

COMPRESSORS D 2 L	
3070	repairs to compressor

COMPRESSORS C P 29	
3071	repairs to compressor

MISCELLANEOUS	
3072	car painting
7001	labor- car cleaning
6701	material- "
7002	labor- car oiling
6702	material- "
6703	lamps
6704	drinking cups
6705	toilet paper
6706	trolley rope
6707	register cord
6708	signal cord
6709	register rolls
6710	motor carbons.
6711	dynamotor carbons
6712	headlight carbons
6713	lamp chimneys
6714	oil for lamps & markers
6715	soda & acid for extingu'hrs
6716	inspector's lanterns
6717	other miscel. supplies
6725	miscl. repairs body eqpt

REPAIRS TO FREIGHT CARS	
3101	ballast cars body
3102	box car body
3103	flat car body
3104	cabooses body
3105	trucks
[illegible]06	changing wheels
3107	turning wheels
3108	brake shoes
3109	journal brasses
3110	couplers
3111	brake rigging
3112	air hose
3113	hand brakes
3114	painting
3115	rep'rs to foreign cars
3116	insp freight equipm't
3117	cleaning & testing air
3118	Repacking & Oiling

SERVICE CARS	
3201	brown hoists
3202	tower cars
3203	tenders
3204	steam shovels

COLLECTORS PASS. CARS	
3301	pantographs
3302	trolley wheel
3303	trolley bases
3340	" poles

WIRING PASSENGER CARS	
3304	main wiring
3305	control wiring

CONTROL EQUIP. PASS. CARS	
3306	controllers
3307	control resistance
3308	operating switch
3309	control coupler socket
3310	control jumper
3311	bussline jumper
3312	bussline receptacle
3313	electric brake
3075	Control Change Over

MAIN APPARATUS	
3314	circuit breakers
3315	reversers
3316	resistance
3317	switch groups
3318	changeover switch

MOTORS	
3319	brush holders.
3320	motor leads
3321	armature bearings
3322	motor bearings
3323	gear cases
3324	pinions
3325	gears
3326	motor cases

MOTORS G E. 205	
3327	changing armatures
3328	rep & rewind. armatures
3329	changing fields
3330	rep & rewind fields.

MOTORS WEST. 321	
3331	changing armatures.
3332	rep. & rewind armatures
3333	changing fields
3334	rep & rewind fields

MOTORS WEST 322.	
3335	changing armatures
3336	rep & rewind armatures
3337	changing fields
3338	rep & rewind. fields

MISCELLANEOUS	
3339	miscel's elect. repairs
7004	inspect. elect. equipm't

BODY LOCOMOTIVES	
3401	couplers
3402	pilots
3403	doors
3404	glass
3405	gongs & signal bells
3406	sanders
3407	safety chains
3408	main body work
3409	identification boxes
3410	steps
3411	roofs
3412	floors

OTHER BODY EQUIPMENT	
3413	emergency tool boxes

LIGHTING & WIRING	
3414	headlights
3415	h'd'lt wiring & resistance
3416	heaters & heater circuits
3417	lights & light circuits
3418	air wiring

AIR BRAKES LOCOMOTIVES	
3419	hand brakes
3420	air piping
3421	air hose
3422	brake valves
3423	feed valves
3424	distributing valves
3425	governors
3426	angle cocks
7005	insp of air equipment

SIGNAL EQUIPMENT	
3427	signal red. valves
3428	signal valves
3429	signal whistle valves
3430	whistles

TRUCK REPAIRS LOCO'S	
3431	spring hangers
3432	brake rigging
3433	turning wheels
3434	changing wheels
3435	changing brake shoes
3436	journal brasses
3437	truck frames
3438	journal boxes
3439	bolsters
3440	springs
3441	equalizing bars

DYNAMOTOR LOCO'S	
3442	dynamotor brush h'ld'rs
3443	" resistance
3444	" wiring

DYNAMOTORS Y.E.3	
3445	changing armatures
3446	rep & rewind armatures
3447	changing fields
3448	rep. & rewind fields

DYNAMOTORS Y. E 4.	
3449	changing armatures
3450	rep & rewind armatures
3451	changing fields
3452	rep. & rewind. fields

DYNAMOTORS C.D.M.13	
3453	changing armatures
3454	rep. & rewind armatures
3455	changing fields
3456	rep. & rewind fields

COMPRESSORS D.2 L.	
3457	repair compressors

COMPRESSORS D.3.L	
3458	repair compressors

COMPRESSORS C.P.29.	
3459	repair compressors

MISCELLANEOUS	
3460	painting locomotives

COLLECTORS LOCOMOTIVES	
3461	pantographs
3462	trolley wheels & poles
3463	trolley bases

WIRING LOCOMOTIVES	
3464	main wiring
3465	control wiring

CONTROL EQUIPMENT	
3466	controllers
3467	control resistance
3468	operating switch.
3469	control coupler socket
3470	control jumpers
3471	buss-line receptacle
3472	buss-line jumpers

MAIN APPARATUS LOCO'S	
3473	circuit breakers
3474	reversers
3475	resistance
3476	switch groups
3477	change over switch

MOTORS - LOCOMOTIVES	
3478	brush holders
3479	motor leads
3480	armature bearings
3481	motor bearings
3482	gear cases
3483	motor cases
3484	gears
3485	pinions

MOTORS WEST. 321	
3486	changing armatures
3487	rep & rewind armatures
3488	changing fields
3489	rep & rewind fields

MOTORS 308 B. 6	
3490	changing armatures
3491	rep. & rewind. armatures
3492	changing fields
[illegible]	rep. & rewind fields

MOTORS 308 D.7	
3494	changing armatures
3495	rep & rewind armatures
3496	changing fields
3497	rep & rewind fields

MISCELLANEOUS	
3498	miscel elect. repairs
7006	insp. of elect. equipm't

SUB-STATIONS	
4801	sub-stations general
4802	repairs-tunnel sub-sta.
4803	" Concord "
4804	" Drawbridge "
4805	" Dozier "
4806	" Lisbon "

CROSSING SIGNALS	
1601	mtce crossing signa
1602	repairs to
1603	" relays res & loca
1604	" other wiring
1605	" trolley contacts
1606	painting crossing signal & poles

AUTOMATIC SIGNALS	
7203	mtce block signals
1702	repairs to relays
1703	" relay wiring
1704	" other wiring
1705	" imp bonds & wiring
1706	" switch boxes
1707	" trans & H.T. fuses
1708	" signals-hoods-poles
1709	" insulated joints
1710	painting poles & signa
2211	repairs to bonding
1512	bridge circuit controll

TELEPHONES	
1801	mtce telephone syste
1802	repairs to instrument
1803	" line
1804	" submarine cab
1805	miscellaneous repa

INTERLOCKING	
7201	operation of tower
7202	mtce interlocking plant
1720	rep to relays & indicato
1721	" trans wiring & [illegible]
1722	" derails & switches
1723	" signals
1724	" interlocking machine
1725	" track circuits
1726	" air lines
1727	" compressor & motor
1728	" storage batt
1729	" insulated joints
1730	painting signals & [illegible]
2214	repairs to track [illegible]

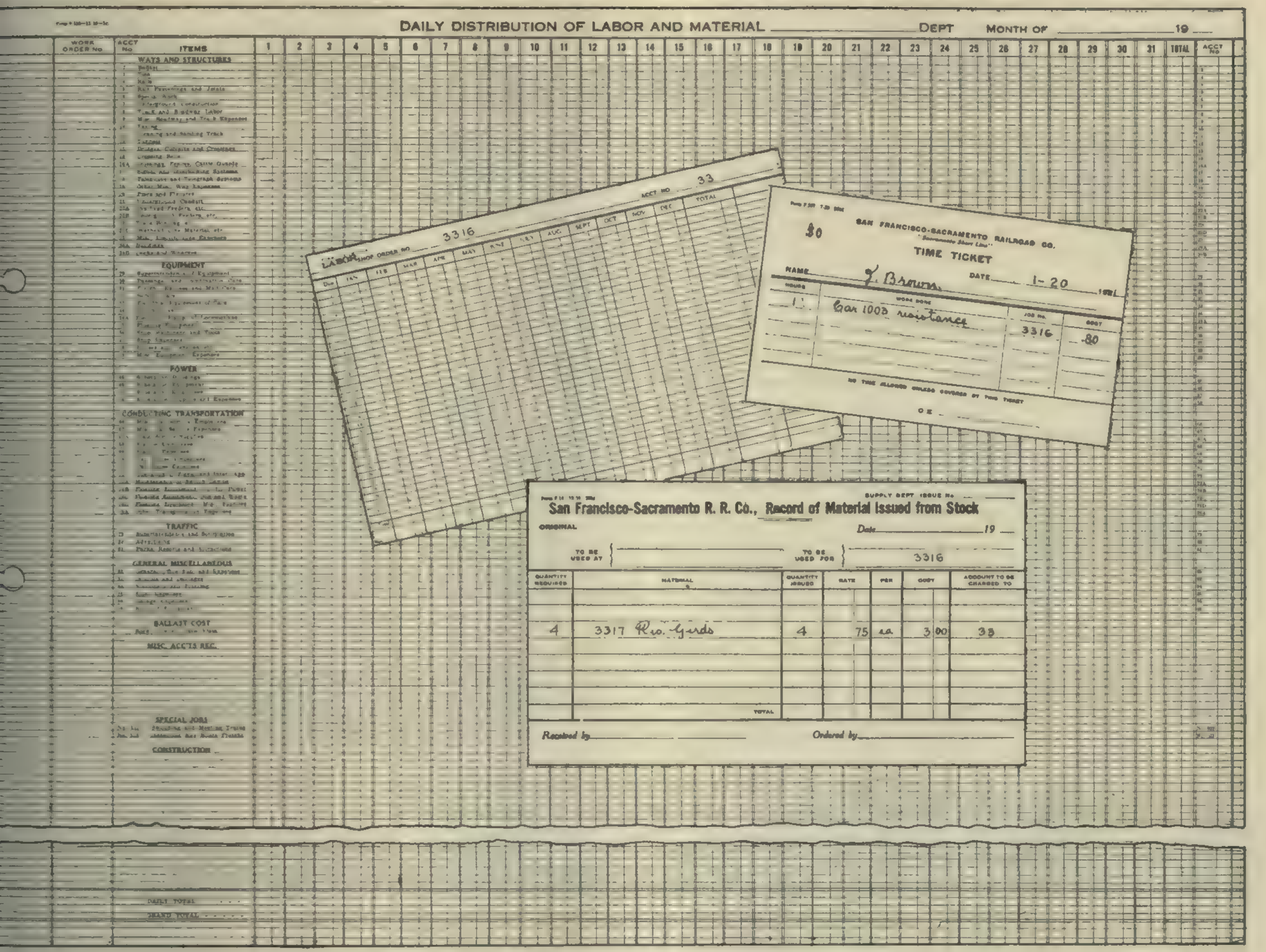
SHOP EXPENSE	
3601	shop tools & machiner
3702	cleaning shop
3703	lighting shop
3704	heating shop
3705	small hand tools
3706	other miscel shop exp

AUTOMOBILES	
3801	repairs to automobiles
9601	gas, oil & etc for [illegible]

MISCELLANEOUS	
901	repairs - roadway tools
902	" track speeders [illegible]
[illegible]	" ferry slips
3504	" ferry boat
7801	mtce shelter are [illegible]
7802	repairs to " "
[illegible]	" sacramento " "
7804	" county tunnel [illegible]
1301	" Underpass Pump

Revised 7-1920

E.D. 114



DAILY DISTRIBUTION OF LABOR AND MATERIAL ________ DEPT MONTH OF ________ 19 ___

WORK ORDER No.	ACCT No.	ITEMS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	TOTAL	ACCT No.
		WAYS AND STRUCTURES																																	
		EQUIPMENT																																	
		POWER																																	
		CONDUCTING TRANSPORTATION																																	
		TRAFFIC																																	
		GENERAL MISCELLANEOUS																																	
		BALLAST COST																																	
		MISC. ACCTS REC.																																	
		SPECIAL JOBS																																	
		CONSTRUCTION																																	
		DAILY TOTAL																																	
		GRAND TOTAL																																	

LABOR SHOP ORDER NO 3316 ACCT NO 33

SAN FRANCISCO-SACRAMENTO RAILROAD CO.
"Sacramento Short Line"
TIME TICKET

$0

NAME J. Brown DATE 1-20 1921

HOURS	WORK DONE	JOB No.	COST
1	Car 1003 resistance	3316	.80

NO TIME ALLOWED UNLESS COVERED BY THIS TICKET

O K ________

SUPPLY DEPT ISSUE No. ________

San Francisco-Sacramento R. R. Co., Record of Material Issued from Stock

ORIGINAL Date ________ 19 ___

TO BE USED AT ________ TO BE USED FOR 3316

QUANTITY REQUIRED	MATERIAL	QUANTITY ISSUED	RATE	PER	COST	ACCOUNT TO BE CHARGED TO
4	3317 Res. Grids	4	75	ea.	3 00	33
	TOTAL					

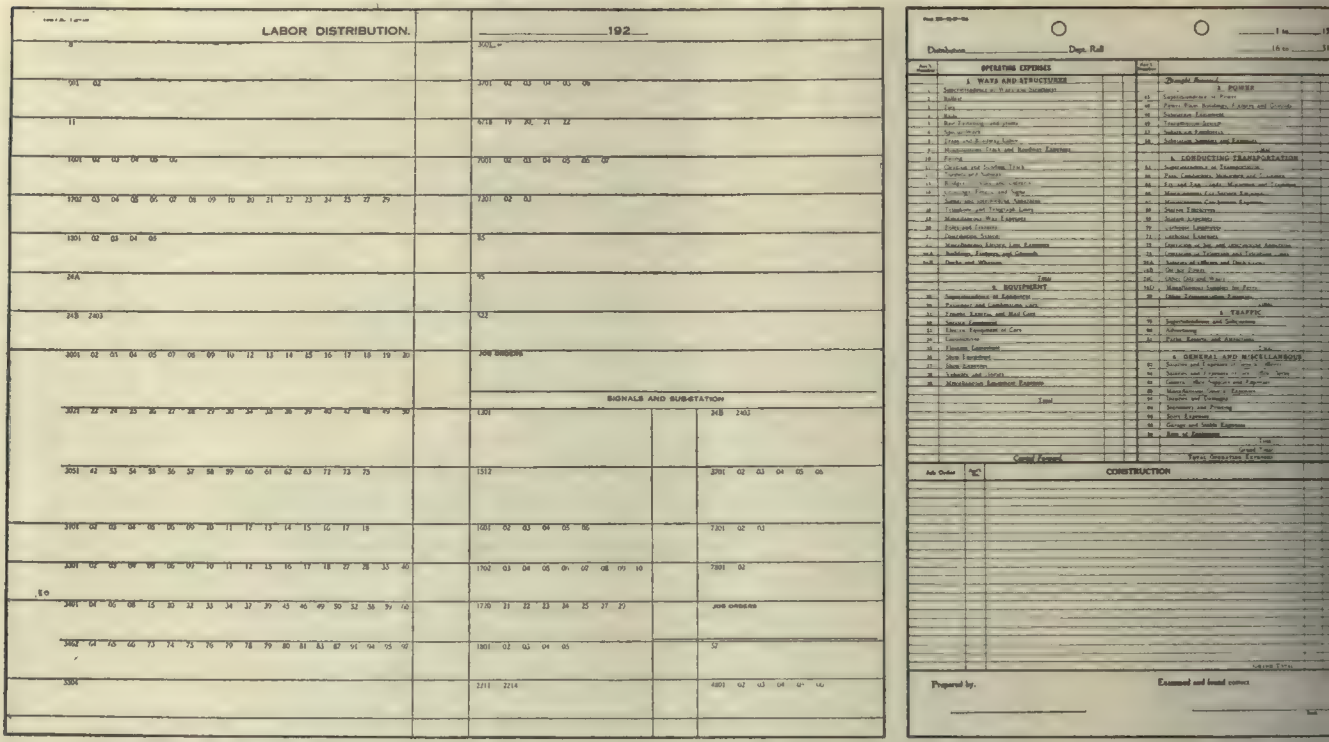
Received by ________ Ordered by ________

LARGE FORM, BASIS FOR SEGREGATION OF ALL LABOR AND MATERIAL CHARGES. INSERT, AT LEFT, LABOR DISTRIBUTION FORM MADE UP FROM TIME SLIPS. AT RIGHT, TIME SLIP USED BY SHOPMEN. BOTTOM, MATERIAL RECORD CORRESPONDING TO TIME SLIP

oremen handling work are held responsible to see hat the men in making out their time slips are charg ng the correct shop order number. In another illus ration is displayed the form of time slip used. Such ips are made out and turned in daily to the foremen, ho approve and forward them to the mechanical department office not later than 10 o'clock the following morning. The slips are then extended by the clerk according to the men's rates, not less than one hour being charged to any Shop Order Number, and the amounts are distributed on the daily "Labor Distribution" form shown on this page. This develops the total amount

TABLE I—MAINTENANCE OF PASSENGER EQUIPMENT, 1920, SAN FRANCISCO-SACRAMENTO RAILROAD

Item	Labor	Material	Total	Per Cent of Sub-Total	
ontrol Equipment (Details)					
Controllers (master)	$81.14	$53.00	$134.14	14.7	
Control resistance	22 57	15.50	38.07	4.2	
Operating switches	2.04	.85	2.89	0.3	
Control coupler sockets	24 31	12.25	36.56	4.0	
Control jumper	87 05	60.49	147.54	16.2	
Bushne jumper	133 87	264.37	398.24	42.8	
Bushne receptacle	78.58	40.28	118.86	13.1	
Electric brakes	2.91	0.09	3.00	0.3	
Control changeover	18 23	16.13	34.36	3.8	
Total	$450.70	$462.96	$913.66		
Per car-mile					$0.00057
ontrol Equipment (Main apparatue)					
Circuit breakers	19.89	19.69	39.58	1 6	
Reversers	159.32	145.01	304.33	12.1	
Resistance	182.27	443.45	625.72	25.0	
Switch groups	787.48	506.47	1,293.95	51.7	
Changeover switches	144.99	74.06	219.05	9.0	
Total	$1,293.95	$1,188.68	$2,482.63		
Per car-mile					$0.00155
ollectors					
Pantographs	856.90	201.99	1,058.89	33.6	
Trolley wheels	504.86	974.52	1,479.38	47.1	
Trolley bases	37.15	58.56	95.71	3.0	
Trolley poles	358.18	249.96	508.14	16.3	
Total	$1,657.09	$1,485.03	$3,142.12		
Per car-mile					$0.00196
Motor (Details)					
Brushholders	$145.06	$145.57	$290.63	7.8	
Motor leads	103.30	238.97	342.27	9.2	
Armature bearings	78.36	454.49	432.85	14.4	
Motor bearings	173.30	753.97	927.27	25.0	
Gear cases	33.26	13.43	46.69	1.3	
Pinions	24.71	495.56	520.27	14.1	
Gears	108.86	765.28	874.14	23.6	
Motor cases	48.50	104.73	153.23	4.1	
Total	$715.35	$2,972.00	$3,687.35		
Per car-mile					$0.0023
Wiring					
Main wiring	108.63	161.79	270.42	51.8	
Control wiring	157.81	93.20	251.01	48.2	
Total	266.44	254.99	521.43		
Per car-mile					$0.0003
Motors West 322					
Changing armatures	329.73	.63	330.36	18.2	
Repairing and rewinding armatures	333.75	770.43	1,104.18	60.8	
Changing fields	77.36	50.70	128.06	7.0	
Repairing and rewinding fields	197.30	52.34	249.62	14.0	
Total	$938.14	$874.10	$1,812.24		
Per car-mile					$0.00113
Grand total	$5,321.67	$7,237.76	$12,559.43		
Per car-mile					$0.00778


LABOR DISTRIBUTION.
192
SIGNALS AND SUBSTATION
JOB ORDERS
Distribution
Dept. Roll
OPERATING EXPENSES
1. WAYS AND STRUCTURES
2. EQUIPMENT
3. POWER
4. CONDUCTING TRANSPORTATION
5. TRAFFIC
6. GENERAL AND MISCELLANEOUS
CONSTRUCTION
Prepared by.
Examined and found correct

AT LEFT, FORM USED TO RECORD LABOR EXPENSE CHARGEABLE TO I. C. C. ACCOUNTS. AT RIGHT, ALL AMOUNTS FOR LABOR ON INDIVIDUAL SHOP ORDER RECORDED ON THIS CARD

spent daily on each of the Shop Order Number accounts and also the Interstate Commerce Commission accounts. These must balance daily with the payroll amount. The amount for each Shop Order Number daily on account of labor is entered up progressively from the first of each month on a 5-in. x 8-in. card having space for each day in the year. There is one "Labor" and one "Material" card for each Shop Order Number of the form shown as an insert on page 717. The material card record is handled the same way through the entering up of the storeroom requisitions, charged to the proper Shop Order Number daily. From these cards progressive records are available of the amounts spent on each account for either labor or material. From the daily labor distribution sheet, which is filed with the time cards after the payroll has been made out, the amounts of labor expense chargeable daily to the Interstate Commerce Commission accounts are entered up on another form, shown at the top of this page. This is carried forward to the end of the month progressively so that the total figure charged to each account appears on the last day of the month. The purchasing and stores department handles the material account in the same way. At the end of the month the form shown on page 717, giving distribution of mechanical and power department payroll by the Interstate Commerce Commission accounts, is filled in and forwarded to the auditor.

Throughout the year special items such as trolley wheels, brake shoes, lubrication, wheels, etc., are taken from the Shop Order Number cards and the cost per 1,000 car-miles for each month computed for plottin in a curve book.

At the end of the year all of the data from the car are totalized and tabulated into an annual report, wit relative per cents of the total and cost per car-mile f the fifty-three main items. In the report are include the operating record of the equipment, changes mad extraordinary worth, etc., as well as the detailed caus of all delays.

The cost of maintaining electrical equipment on pa senger cars for the year 1920 is given in Table I. Th represents two pages out of the forty-two-page repor and will serve to illustrate the methods of keeping an tabulating the various costs.

In Table II will be found rolling equipment perform ance data for the years 1915 to 1920 inclusive, also elec trical equipment maintenance costs for the same perio of time. The latter shows the effect of war-time wage and material during the past three years on delays t service and cost per 1,000 car-miles.

This system gives very complete data and is applicabl to any electric railway or electrification where accurat detailed costs are desired. It serves as a check on th cost of maintenance and alleviates numerous troubles b indicating the cause, thus permitting a slight change i equipment or operating conditions. The writer ha attempted merely to outline the method that has bee used very successfully by F. A. Miller, superintenden of power and equipment of the San Francisco-Sacra mento Railroad.

Table II—ROLLING EQUIPMENT PERFORMANCE DATA

Year	1915	1916	1917	1918	1919	1920
Passenger Equipment						
Total mileage including trailers	1,562,264	1,435,183	1,569,075	1,429,346	1,556,932	1,616,31
Total number delays—all causes	37	35	37	43	25	2
Total minutes delay	806	736	1,118	1,625	562	66
Average length delay minutes	21.7	21	30.2	37.8	22.4	25.
Car-miles per delay	42,223.3	41,005.2	42,677.0	33,240.0	2,277.0	62,166
Number delays per 1,000 car-miles	0.023	0.024	0.0234	0.03009	0.016	0 016
Minutes delay per 1,000 car-miles	0.516	0.513	0.707	1.1371	0 361	0 418
Electrical maintenance cost per 1,000 car-miles	$3.13	$5.35	$4.45	$8.07	$6.37	$7 7

Electrical Insulating Materials[*]

The Most Essential Characteristics of Insulating Materials Are High Dielectric Strength and Ohmic Resistance, but Ability to Withstand Considerable Mechanical Stress and Heat Is Also Desirable

BY NORMAN LITCHFIELD

THE old analogy of electricity to water under pressure, flowing through a pipe, while not scientifically accurate, has served well to give a general idea of some electrical functions and properties, and may equally well be used to show the relation between electric current, the conductor and the insulator, the first being analogous to the fluid, the second to the bore of the pipe and the third to the walls of the pipe. It is with the last named that we are concerned in this article, and an attempt will be made to sketch the nature and properties of some insulating materials which are in general use in the electric railway field. The insulator, like the pipe walls in the conduction of water, must prevent the electricity from bursting violently through so that it is all lost, before arriving at its proper destination, and it must not permit small quantities to ooze through, thus losing in the aggregate a considerable amount. If the former occurs, we have what is designated a "short" circuit, because the electricity has taken a short path back to the source of supply, without traversing the long path through the working machine as intended.

Furthermore the insulating materials must continue to fulfill these functions over reasonably long periods, despite the adverse and deteriorating conditions to which it is naturally subjected in its place of use.

The ability of the material to resist the tendency of the electricity to burst through is known as the dielectric strength; that preventing leakage is the ohmic resistance.

Again, just as water is conducted through pipes of iron, wood, stone, concrete, glass, brass, copper, rubber, etc., depending on some particular mechanical quality of the conducting substance, so it has been found by long and costly experimentation that certain insulating materials possess particular electrical, mechanical and other qualities which render them more suitable for use under some specific set of circumstances than others. The chief of these characteristics are the following: (1) Dielectric strength, (2) ohmic resistance, (3) tensile strength, (4) resistance to abrasion, (5) flexibility, (6) stability under heat, (7) stability under moisture, (8) stability under vibration, (9) ability to be molded into a given shape, (10) ability to take high surface polish, (11) ability to withstand climatic conditions, (12) fireproof qualities, (13) resistance to electric arc, (14) cost.

For general use rubber has proved to be the material most generally adaptable. In fact, rubber may be said to go hand in hand, as it were, with copper in differentiating the electrical industry from other industries. Copper's influence was already mentioned by the writer in a recent article in the ELECTRIC RAILWAY JOURNAL on the nature and uses of that metal. Copper as a conductor and rubber as an insulator, together with iron as the magnetic material, form the material backbone of the electrical industry. It is interesting to note that the name "rubber" as applied to caoutchouc is a purely colloquial one, the origin being the suggestion of the English chemist Priestly, toward the end of the eighteenth century, that caoutchouc was useful for "rubbing out" pencil marks. It was immediately used for this purpose and became known as "India rubber."

Soft Rubber Insulation for Wires and Cables

The basic material of the rubber insulation used in cables, etc., is India rubber, or caoutchouc. This is the milky juice which oozes out and then coagulates when the skin of the plant is punctured. The grade of the rubber varies with the plant and with locality, the highest grade coming from Para, in Brazil, produced by plants of several kinds of that class known to botany as Hevea. This grade is therefore sometimes called Hevea rubber, but its usual designation is Para rubber. It is of course not always necessary to use the highest grade of rubber, but practically all specifications for insulation require a certain percentage of "pure Para rubber."

Rubber in its natural state, as it comes from the plant, becomes hard and stiff when cold, and it is therefore unfit for most commercial purposes in its untreated condition. One of the great epoch-making discoveries in this field was that by Charles Goodyear, in 1844, of the process known as "vulcanizing" rubber. In this process the rubber is mixed with sulphur in a light powdery state (flowers of sulphur) at low heat, and is then "cured" in superheated steam at about 300 deg. Fahr. The whitish natural rubber by this process becomes gray and hornlike, and in this state is but little affected by cold. By variation in the amount of the sulphur and the degree of heat, various different graduations of hardness are obtained up to the hard grade known as hard rubber, vulcanite or ebonite, the varying shades of color being the result of additions of mineral matter and old rubber.

Rubber insulation, even in the best grades, contains but little more than 30 per cent of new rubber. Thus the tentative specifications of the American Society for Testing Materials for insulated wire permit, in addition to new Hevea rubber, "waxy hydrocarbons consisting of ceresin or refined paraffin, sufficient sulphur properly to vulcanize any inorganic mineral matter," the rubber content being from a minimum of 30 per cent to a maximum of 33 per cent.

The amount of rubber in the insulation practically determines its price, 30 per cent and up being the highest commercial grade. Lower percentages are often used, however, it being quite common on car equipment to use 20 or 25 per cent. The equipment committee of the American Electric Railway Engineering Association in 1915 put itself on record as follows: "There can be no question but that 30 per cent pure Para rubber would give the best results, and its use may be advisable in special cases, as where cars are operated in subways, and there is a liability to small short circuits which might cause smoke, fire or a possible panic. However, the wire referred to by manufacturers as containing 20 per cent pure Para rubber is giving general satisfaction and it is felt that 30 per cent makes an insulation probably more expensive than is necessary. Especially does this seem to be the case in view of the fact that car wiring is often removed after a few years, in which event if 30 per cent compound were used the benefit of longer service for the extra expense would not be obtained." The committee then calls attention to the specification for rubber-insulated wire for power distribution purposes given in section Dw8a of the Engineering Manual of the Engineering Association, and gives as its opinion that the specification covers a quality of insulation satisfactory for car equipment purposes.

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[*] This is the last of a series of seven articles prepared by Mr. Litchfield to bring about better co-operation between users and makers of electric railway equipment. The previous articles appeared in issues of this paper for Feb. 21, 1920, page 366; April 17, 1920; page 803; June 19, 1920, page 1247; July 17, 1920, page 115; November 20, 1920, page 1051, and December 18, 1920, page 1229.

Since the publishing of the above opinion the power distribution committee has revised its specification to Dw8b, which "is the result of a demand for low grades of wire and cable, insulated with Para rubber compound, that can be used for line and equipment purposes," the 30 per cent compound being entitled "Grade A" and the 20 per cent "Grade B." For Grade A, the composition required is the same as that already quoted from the A. S. T. M. tentative specifications, namely, rubber, sulphur, inorganic mineral matter and refined solid paraffin or ceresin.

Both the A. E. R. E. A. Grade A and the A. S. T. M. specifications are the result of the work of the joint rubber insulation committee, a full report of whose work is given in the 1914 Proceedings of the American Institute of Electrical Engineers, which not only laid down the desired composition but also the exact method of analysis, as it was found that with different methods quite widely varying results were obtained from the same material. This method is given in detail in the A. S. T. M. and A. I. E. E. publications, and as it is not of general interest to the user of the insulation will not be quoted further. It may simply be stated that the method finally adopted was that which all agreed would show whether pure Para rubber had been used, and in what amount.

For the Grade B insulation the A. E. R. E. A. specification does not require pure Para rubber, but simply that the insulation shall contain not less than 27 per cent of rubber gum. Five chemical tests are prescribed, namely, acetone extract, alcoholic potash extract, chloroform extract, ash and total sulphur. It is required that the sum total of the results of these five tests shall not exceed 73 per cent by weight of the total compound, the tests to be made in accordance with the Underwriters' Laboratory specification. Obviously the specification for the Grade B material is much less exacting than that for the Grade A.

In passing it may be said that the making of rubber analysis is a difficult matter, requiring the services of an expert chemist. It is, therefore, somewhat expensive and for this reason a chemical analysis is not always resorted to by the user.

For physical properties the A. S. T. M. specification requires the following: Tensile strength, minimum, 1,000 lb. per square inch; set, maximum in 2 in., ⅜ in.; elongation, minimum before rupture, 2 to 9 in.; test specimen to be 2 in. long between bench marks, and to be stretched at the rate of 20 in. per minute until the specimen breaks.

For testing the set, another 2-in. specimen is stretched at the rate of 20 in. per minute until the bench marks are 6 in. apart, and released within another five seconds. The set is determined one minute after the beginning of release. The elongation test is made on the same specimen used for the set test, and after the completion of the latter. It is stretched at the rate of 20 in. per minute until it breaks.

The physical requirements of the A. S. T. M. specification as given above, are somewhat different from those of the A. E. R. E. A. in its specification Dw8b already referred to, which requires as follows: Tensile strength, minimum, 1,000 lb. per square inch; elongation at break, five times original length, or four times original length if specimen is over 12/64 in. thick; elongation five seconds after release when stretched at rate of 12 in. per minute to three times its original length, 20 per cent.

For convenience we may set the equivalent values one against the other, as follows:

	A. S. T. M.	A. E. R. E. A
Original length	2 in.	2 in.
Tensile strength	1000 lb. per sq. in.	1000 lb. per sq. in.
Rate of stretch for tensile test	20 in. per min.	12 in. per min.
Elongation measured on	"set" specimen re-stretched after set test to rupture	"tensile" specimen at rupture
Elongation (times original length)	....	5, or 4 if specimen is over 12/64 in. thick
Elongation	2 to 9 in.	....
Set in per cent of original length	18¾	20
Set in inches	⅜ in.	2/5 in.

It therefore appears that the two sets of requirements are very nearly alike, and it would seem that in the interest of standardization the two specifications should be brought to agree, inasmuch as either one probably insures the desired qualities.

With regard to electrical properties the chief, in addition to chemical and physical features already outlined, are, first, dielectric strength, which is the property of resisting the puncturing of insulation by high voltages, and second, ohmic resistance, which is the property of resistance leakage.

Both of these tests are made after immersion in water for a given period and while the specimen is still submerged. Of the two, the breakdown or dielectric strength test is the more important. It is usually made on the basis of twice the normal voltage plus 1,000 volts. Detailed figures are given in both the specifications already referred to.

It may not be amiss to point out that the purpose of the foregoing tests and requirements is to provide a material that will (1) stand high voltages without puncturing, (2) prevent leakage, (3) bend without cracking, (4) not become hard or otherwise deteriorate with reasonable age, (5) not absorb moisture and (6) withstand reasonable temperatures.

Reference to fireproofing has been omitted for the reason that the application of a fireproof covering has generally the effect of giving a tendency to absorb moisture, thus causing liability to short circuit and thereby to starting fires where no fire existed. Fireproof insulated wire is made and is used successfully in places where the temperature is so high that the ordinary insulation will not stand up. It cannot be exposed directly to moisture.

Much more could be said in relation to methods of manufacture, braid coverings, cotton separators, etc., but these subjects are hardly germane to the purpose of this article, which is simply to give an outline of the nature of the common insulating materials. Emphasis should nevertheless be laid (as the writer has done in connection with other materials) on the skill and integrity of the manufacturer, without which no specification is effective.

COTTON AND PAPER INSULATION FOR WIRES AND CABLES

Small wires, such as are used in small armature and other coils, are quite generally insulated with cotton, either wound on the wire in the form of thread or in woven tubular form. Cotton insulation needs no special comment other than that it is used only where the differences in potential are small. It is often impregnated with some insulating varnish, the nature of which will be discussed later.

For lead-sheathed cable for power distribution purposes the insulation is composed chiefly of paper. A good description is given in the A. E. R. E. A. standard specifications for three-conductor cable, an extract from which follows:

> The cable is to be composed of three copper conductors, each separately covered with paper tape to the required thickness and then twisted together with a suitable lay. The interstices are to be rounded out with jute and the whole wrapped with a paper belt to the required thickness.
>
> The paper, soaked in a suitable insulating compound, is to be covered with a lead sheath of the required thickness. The highest grade of pure manila rope paper tape shall be applied helically and evenly to each of the conductors until the required thickness of paper is obtained.
>
> All moisture shall be expelled from the paper and jute by baking in suitable ovens; they shall then be thoroughly saturated with the insulating compound of the required kind and quality.

This arrangement makes a tough, resistant insulation which bends the conductors tightly, keeping them from shifting and wearing into the insulation.

LINEN AND SILK USED WHERE MECHANICAL STRENGTH IS NECESSARY

Linen and silk are generally used as cloth, treated with linseed oil or some insulating compound. Being of a finer texture and greater mechanical strength than cotton, they are used in places where these qualities warrant the extra expense.

Glass and porcelain are excellent insulators, but have only a limited field on account of lack of mechanical strength. Both are used extensively for line insulators, porcelain being preferable. The latter is also used for commutator brush supports and cores for heater coils. Its chief requisite is that it shall maintain an unbroken surface, as when the glaze becomes cracked dust and dirt and moisture soon accumulate and the insulator breaks down.

Wood, though a fairly good insulator when dry, absorbs moisture readily, and unless used in large masses must be painted or impregnated with some protecting paint or varnish. Familiar uses are line poles, crossarms, pins, trolley stand boards, contact shoe beams, etc.

The use of mica as the separator between the bars of commutators is familiar to all. It is universally employed for this purpose. Chemically it is a crystalline salt of aluminum and potassium or sodium. The crystals easily split up into thin sheets. Its color varies from white to amber, the latter being the softer grade.

Besides being used in its natural state, it is often used in composition with other materials. Thus "mica plate" is made up of small pieces of mica and paper treated with a special binding material and steamed under pressure. Other compounds of mica are micanite, micarta, etc.

The chief uses of mica and its compounds are in places where the temperature is apt to reach a point where other materials would not stand up or where a high degree of insulation must be maintained in very small thicknesses. While the white mica is the better insulator, the amber mica is the softer and is therefore used on commutators which are not slotted and in which the mica must wear down as quickly or more rapidly than the copper itself.

Asbestos, found chiefly in Canada, consists mainly of silicate of magnesia, fibrous in its nature, and capable of being woven if combined with cotton or other material, the fiber of the asbestos being too short to give the necessary strength alone. Its dielectric strength is not great and its chief use as an insulator comes in places where a high temperature or arcing occurs. It is familiar to all in the form of tape, cloth, paper, wallboard and "lumber" or "shingle," the latter being compounds of asbestos and portland cement.

Shellac, which is used as a binder, is a peculiar form of resin, the name being in reality a combination of the two words, shell and lac; that is to say, shellac is a shell-like form of lac. Lac is formed by an insect or parasite that lives on a tropical tree. The female sucks the juice from the tree, digests it and exudes it over herself, finally incrusting herself entirely with it, and lays her eggs in this envelope. In true India fashion she dies therein and her progeny eat her carcass and break their way out through the lac envelope. The twigs of the tree are covered with these envelopes and in this form are known as stick-lac. The lac is rubbed off the twigs and washed in water and in this form is called seed lac. These seeds are placed in cotton bags before a fire and the bags squeezed, the lac dripping out in much the same fashion that the housewife strains fruit juice for jellies. The lac drops on rollers or sticks to which it adheres in a thin shell, hence the name of "shell-lac."

MOLDED INSULATION HAS MANY FORMS

Molded materials derive their names from the fact that they are formed in molds and generally under pressure. They thus can be given practically any form, often with a high surface finish and of accurate dimensions. In many cases the molding process also permits the inclusion of brass inserts which are locked in by the compound around them and which can be tapped for screws, etc. They consist of mixtures, sometimes chemical compounds, of some of the materials already mentioned, rubber, asbestos, mica, fiber, shellac gums, asphaltic compounds and the so-called "synthetic resins." They are composed essentially of a filler and a binder, either of which may be the actual insulator, the other being included to give the desired form and mechanical properties.

Practically all are "trade compounds," the exact nature of which is kept more or less secret, but it is possible to give the reader a general idea of some of the better known materials. Those who are more particularly interested in the detailed chemical analysis will find several books and technical articles in the chemical press, to which they are referred.

The question is sometimes asked as to which is the best insulator among the molded materials, and in answer it may be generally said that that depends on the service to which it is to be put. Sometimes the need for great dielectric strength is paramount, at other times the electric stresses are not excessive, but the part must withstand considerable mechanical stress. At still other times heat is the controlling feature, or moisture may be the determining factor. Various compounds have been developed to meet these particular conditions, it being more or less true that one form of excellence is usually obtained at the expense of other points.

Thus, according to one authority, "compounds using the various grades of shellac as a binder are as a rule of low heat-resisting qualities, and owing to the nature of the filling materials, such as fiber and ground mica, will not take a practically high finish. These same fillers, however, impart to the stock relatively high mechanical and dielectric strength."

On the other hand some of those compounds using rubber as a binder "have relatively low mechanical strength of one sort, but have great strength of another sort, in that they successfully withstand blows and sudden shocks, being slightly elastic; that is to say, not at all brittle. On the other hand, they will not readily take inserts, such as screws and small metal parts. Their flexibility, however, permits them to be readily molded into large heavy shapes, and they are particularly adaptable, owing to their high resisting qualities for such parts as grid resistance frame bolts, fingerboards, division plates, arc chutes, coil and switch boxes. The flexibility also permits this class of material to be used for parts that are bolted or clamped to uneven surfaces of any kind, as, for instance, busbar installations.

In mechanical strength the synthetic resins, such as "Bakelite," stand alone among the molded compounds. Furthermore, they do not absorb moisture and they resist the action of nearly all acids and alkalis and can be used in the presence of oil.

In determining the relative value of the various materials four chief tests are made in the laboratory. The first of these is the dielectric strength test, in which it is customary to immerse the piece in oil, to decrease the surface leakage by increasing the dielectric surrounding the test piece. This permits the piece to be punctured before it arcs over. When the piece is punctured its thickness is measured in thousandths of an inch and the dielectric strength is calculated in volts per mil.

The second test is that for mechanical strength. The tensile strength is determined on a flat piece ½ in. thick and of shape approximating the figure 8, with the use of special clamps in an ordinary tensile test machine. The compressive strength is obtained on a specimen molded in the form of a cube in a hardened steel mold, 1 in. on edge. The transverse strength is determined on a ½-in. square specimen, 5 in. long. The maximum fiber stress is calculated by the formula $\frac{S = 3PL}{2BD^2}$, in which S = maximum fiber stress, P = load applied, L = distance between supports, B = width of specimen and D = depth of specimen.

The third test is that of distortion under heat, in which a test specimen is used for the same size and shape as that used in the transverse test. A specia apparatus is used in which the specimen is supported on two steel supports, with a load applied on top of the specimen vertically and midway between the supports The vessel in which the specimen is placed on these supports is surrounded with oil in another outside vessel. Arrangements are made for raising the temperature of the oil gradually. The machine is so arranged that the deflection of the specimen at the center can be measured on a scale, and is equipped with a thermometer so that the temperature of the specimen can be recorded at any time.

The fourth test is that of the effect of moisture, in which the original weight of the specimen is obtained, the dry weight after heating in an oven for a specified time and the saturated weight after immersion in water for 100 hours. Record is also taken of the percentage of moisture in the specimen as received, and the percentage of moisture absorbed during 100 hours, taking the dry weight as 100 per cent.

In the tensile and compressive test specimens are tested under three different conditions, namely, (1) In condition in which they are received, (2) after heating in an oven for one hour at a temperature 10 deg. C. below the distortion point of the material, as determined by the distortion test, and (3) after being entirely immersed in distilled water for forty-eight hours at normal room temperature.

In the transverse test specimens are tested as received, and also after immersion. Dielectric tests are made of specimens as received, after heating in oven and after having the rim immersed in melted paraffin for a depth of 1 in. and been entirely immersed in distilled water.

Further details of the tests will be found in "Tentative Tests for Insulating Materials," published by the American Society for Testing Materials, and from which the above was taken.

MOLDED MICA, ETC., USED FOR OUTDOOR WORK

The mica compounds use shellac as a binder, and often contain a certain amount of asbestos, which by virtue of its fibrous character gives the composition a mechanical strength which the mica alone does not possess. All of the materials being weatherproof, this composition lends itself to outdoor work.

The word "Vulcabeston," while a trade name, has been in use so long as practically to represent compounds of asbestos and rubber which are vulcanized.

"Bakelite" is the name given by Dr. Bakeland, the inventor, to a material made by his patented formula. It is essentially a product of the modern chemist, it being what is known as a synthetic resin; that is to say, a resin not found in nature, but one put together from certain definite materials according to a special process. The chemist tells us that it is a compound of formaldehyde and phenol, which admittedly does not convey much information to any one but a chemist. Suffice it to say that they are both organic compounds (not mineral) and are constituents of coal tar, that marvelous substance which results from heating coal with insufficient air and from which have sprung the extraordinary series of aniline dyes, perfumes, medicines, high explosives, etc., with which the modern chemist has astonished the world. These two compounds when properly treated combine to form the remarkable transparent substance "Bakelite," with which we have all become familiar in the form of pipe stems, fountain ens and toilet articles. In molded insulations it is sed as a binder with wood or asbestos as a filler and is olored with various dyes.

PHYSICAL AND ELECTRICAL PROPERTIES

According to the authority already quoted, the dielecric strength and other properties of various composiions are as follows:

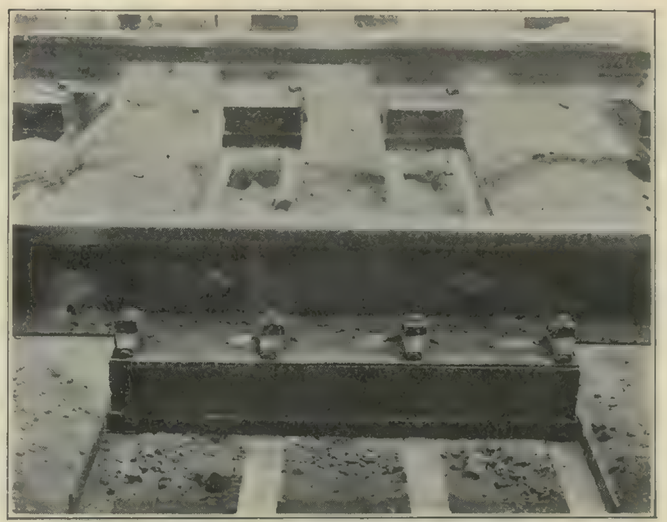
	Dielectric Strength, Volts per Mil	Transverse Strength Lb. per Sq.In. Cross-section	Heat Test, Deg. F.	Absorption After 48 Hours in Cold Water, per Cent
nellac—mica compounds...	300-330	7,000–11,000	120–185	0.2–5.0
sbestos—rubber compounds	90-180	3,600– 9,000	300–500	1.5–0.6
akelite compounds........	230–300	13,000	225–300	0.6–0.1

No attempt has been made in this article to cover all he materials for insulating purposes or to give more han a bare outline of some of the more salient charcteristics thereof. But the subject is one which has eceived but little attention in the electric railway press, nd this article may therefore serve to throw some light n these very interesting materials.

Resilient Track Laid in Wausau

ompany Operating in Small Wisconsin City Free from Paving Burden—Constructs Track Ahead of Paving Work Which Is Done by the City

THE Wisconsin Valley Electric Company, which operates the local street railway system in Wausau, Vis., built 1 mile of double track last year, making use f a monolithic concrete paving and substructure contruction and Dayton mechanical ties. As the company as relieved from doing any paving on streets occupied y car tracks, the pouring of the concrete paving in the rackway as well as at the sides of the streets was done y the city. The street railway company therefore asembled the ties and rails, welded the joints and brought he track to grade and alignment ahead of the paving ork, and then had the city pour the concrete for the ubstructure as well as for the paving in the trackway. he concrete pavement was made 8 in. thick outside the ar track, while the thickness of concrete in the trackway ran to 15 in. The company then simply reimbursed the city for the additional 7 in. of concrete placed in the track foundation. While the track construction was going on, the old track was thrown over to one side of the street and operation continued, as shown in one of the accompanying pictures.



CLOSE-UP VIEW OF JOINT CONSTRUCTION SHOWING APEX WELDING AND RESILIENT MECHANICAL JOINT TIE

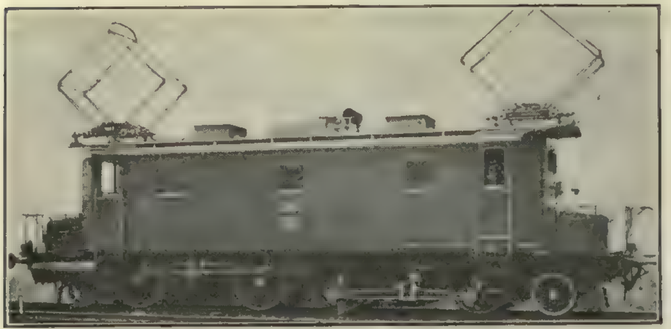
The type of construction used, employing T-rail, with the "Apex" welded joints of the Indianapolis Switch & Frog Company and the patented ties and special joint ties of the Dayton Mechanical Tie Company, are shown in the accompanying pictures. In speaking of the results obtained with this type of construction, N. C. Rasmussen, superintendent, made this comment:

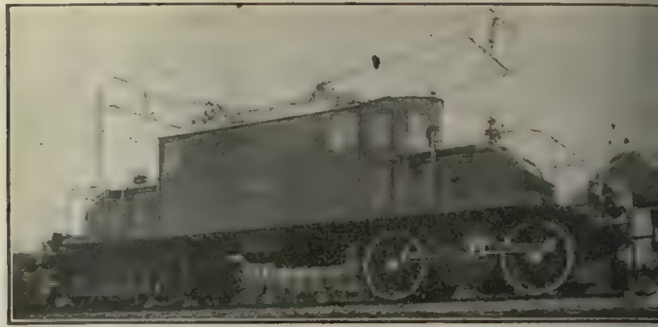
"It is of course too early to say how this track is going to stand up under traffic, as it has not been in service long enough, but from the indications thus far it is all right. It rides smoothly and quietly and we believe it is the coming thing in track construction."

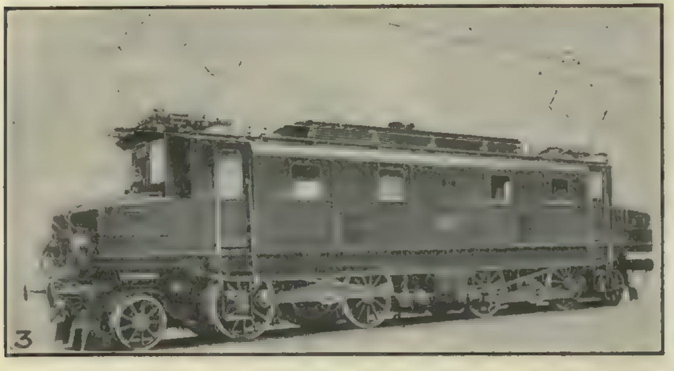
In the accompanying picture showing the completed track construction it will be noted that the concrete paving has been crowned between the rails to make the flangeways. The black jagged appearance along the flangeways is sand and refuse and not chipped concrete, as one might be led to believe.

AT LEFT, TRACK CONSTRUCTION BLOCKED UP TO GRADE, SHOWING MECHANICAL TIES IN PLACE READY FOR POURING CONCRETE BASE AND PAVING, AND, AT RIGHT, APPEARANCE OF COMPLETED CONSTRUCTION

Representative Types of Swiss Electric Locomotives







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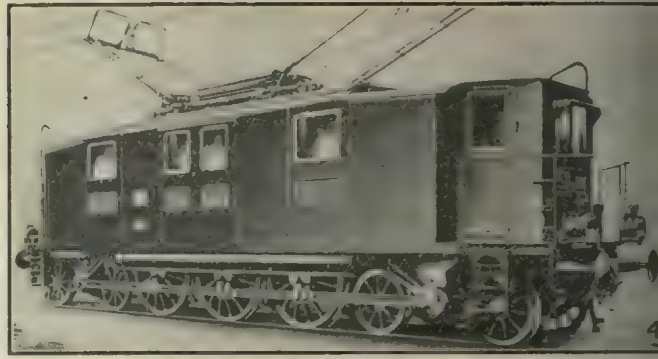

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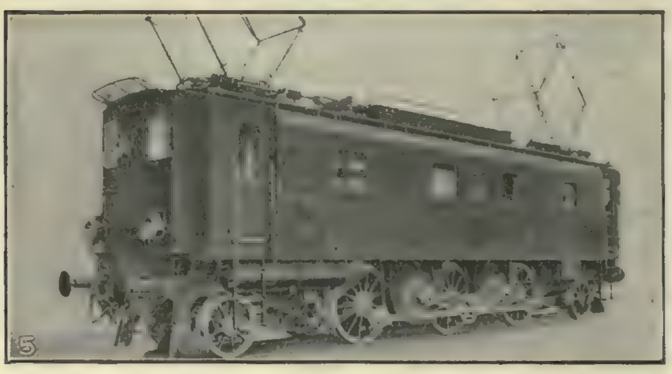

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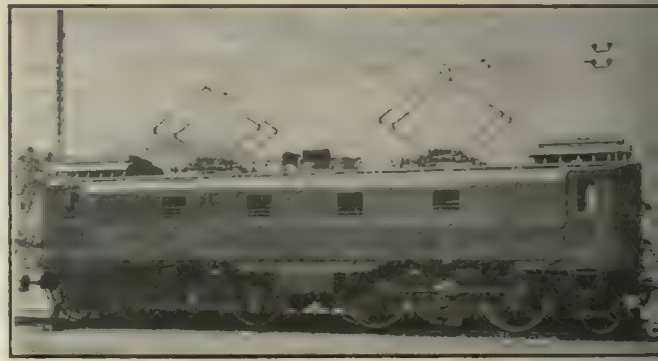

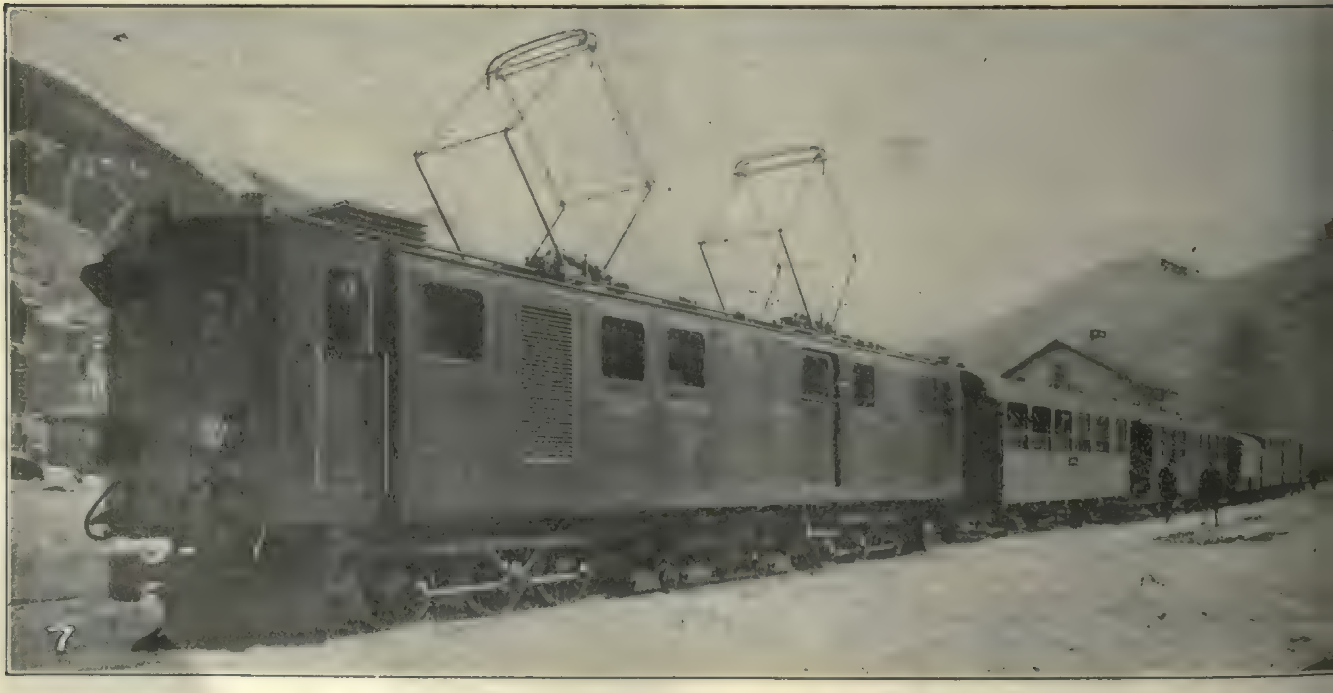

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No. 1—Single-phase locomotive for the Bernische Dekretsbahnen made by B. B. & Cie.

No. 2—Latest three-phase type BB locomotive (BBC) for the Burgdorf-Thun Railway.

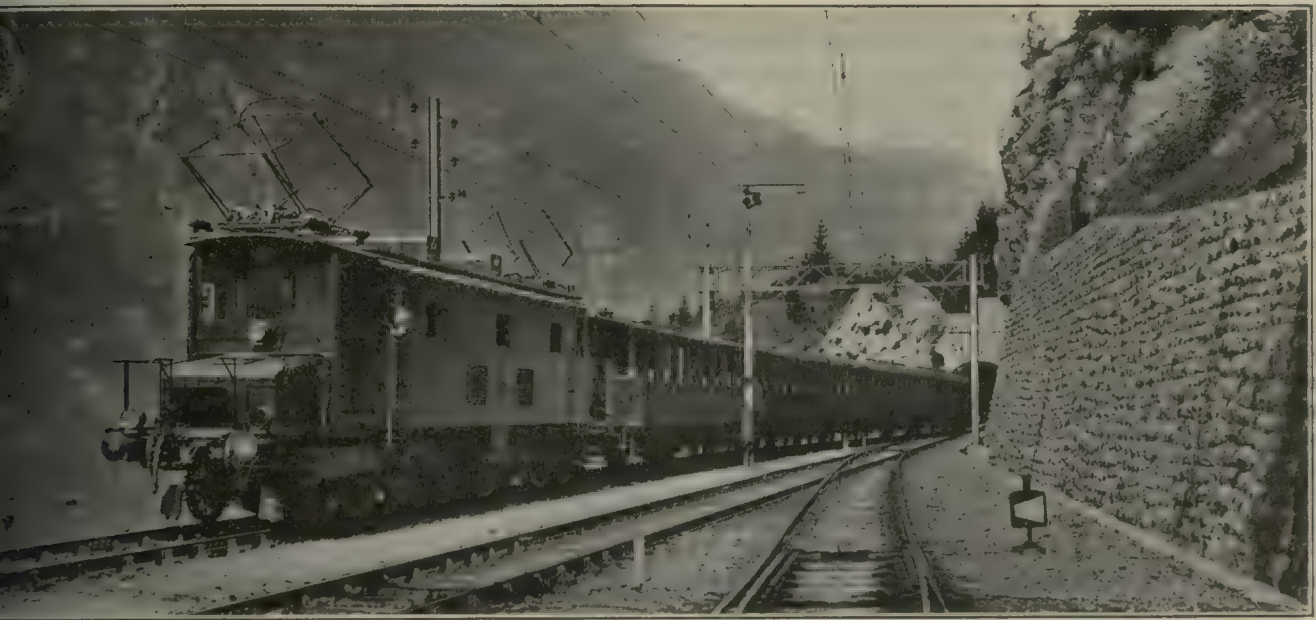
No. 3—Swiss Federal Railways locomotive—an Oerlikon type 1-B-B-1.

No. 4—A three-phase Oerlikon locomotive, Italian State Railways.

No. 5—A-1-C-1 type Oerlikon locomotive used on the Swis Federal Railways.

No. 6—One of the type 1-B-B-1 locomotives (BBC) used in th St. Gotthard Railway electrification.

No. 7—Bernina Railway type CC single-phase freight locomo tive made by Brown, Boveri & Cie. with a 100-ton train at Pos chiavo station.



A TYPE 1-BB-1 OERLIKON LOCOMOTIVE OF THE BERNESE RAILWAY

Swiss Electric Locomotive Progress

etails Are Given of Recent Locomotives Equipped by the Leading Two Builders of Electrical Apparatus in Switzerland—Particular Attention Is Given to the Machines for the Federal Railways—Some Experiments with New Types of Drive Are Included, Indicating a Leaning Toward Gears as a Substitute for Side Rods

THE electrification situation in Switzerland was briefly summarized in the issue of this paper for Jan. 1. For that issue the important Swiss manu-
cturers of electrical equipment, Brown, Boveri & Cie.,
aden, and the Ateliers de Construction Oerlikon,
irich, had arranged to furnish the latest information
the electric locomotive construction of these com-
nies. However, owing to the post-war slowness of
e mails the information arrived too late for the annual
atistical issue, but it is given in part below. The
rpose of this article is to give interesting detail re-
rding some of the latest commercial and experimental
comotives, for the purpose of indicating the nature of
e problems which the necessity for immediate electri-
ation has imposed on the engineers of Switzerland.

LOCOMOTIVES FOR ST. GOTTHARD

Pre-eminent at the moment is, of course, the St. Gott-
rd electrification, now in partial operation. An illus-
ated and detailed description of the freight locomotive
rnished by the Oerlikon Company appeared in the
ue of this paper for Aug. 7, 1920, page 256. Of this
pe, 1-C-C-1, thirty-three machines have been ordered
to about Jan. 1. This company is also furnishing
omotives of two other types for fast trains, 1-C-1
d 1-B-B-1. Data regarding all of these are given in
ble I, and the appearance of the 1-B-B-1 machine
shown in the photographs reproduced.

A number of locomotives have also been furnished
the St. Gotthard electrification by Brown, Boveri
Cie. The plan of the State Railways before the war
s to conduct extensive experiments on the Loetsch-
g line with several types of locomotives for the St.
tthard electrification, but the critical coal shortage
ced the prompt completion of the initial installation.
Brown, Boveri & Cie. are building two types of locomotives for this line, one for express passenger trains, the other for freight trains. Following are some details of the former:

The running gear of the machine is in two sections, each containing two driving axles and a pony axle. The two trucks are connected by means of a flexible coupling. Two motors of a truck drive, through pinions, a gear mounted on a jackshaft which is connected by connecting rods with the driving axles. To reduce the vibration due to the single-phase current all pinions are provided with rims flexibly mounted on the centers. This also insures uniformity in contact of the gears on the two sides, the transmission being bilateral, with a 90-deg. angular displacement of the two drives.

The cab rests on two supports on each truck. The center plate of one is fixed, while longitudinal movement of the other is provided. This prevents any transmission of force from truck to truck through the cab. There are also auxiliary points of support for the cab to distribute the weight properly. These are near the interior motor axles.

The locomotive is equipped with Westinghouse air brakes, four brakeshoes to the driving axle. The compressed air for brakes, sanders, whistles and electrical

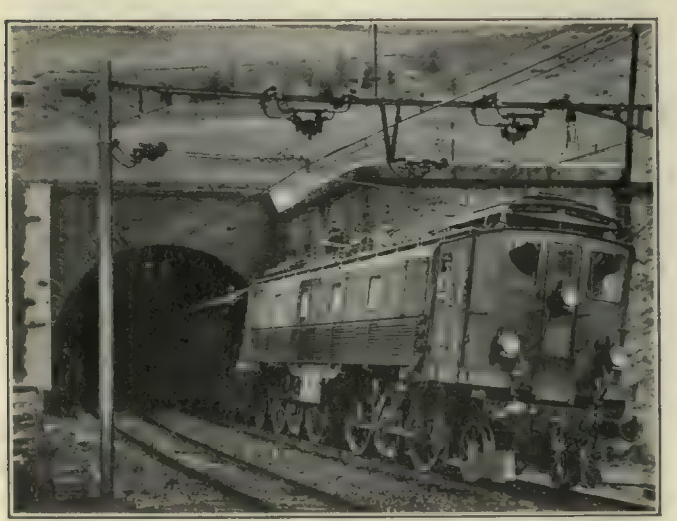
TABLE I—DATA OF OERLIKON LOCOMOTIVES FOR ST. GOTTHARD ELECTRIFICATION

	1-C-1	1-B-B-1	1-C-C-1
Maximum tractive effort, pounds	24,800	39,600	52,900
Horsepower at wheel rim (1½ hour)	1,650	2,250	2,200
Normal speed, miles per hour	32	32	21.7
Maximum speed, miles per hour	66.6	66.6	40.4
Trailing load on 2.6 per cent grade at normal speed, tons	237	330	475
Weight complete with equipment, tons	100	125	141
Maximum wheel pressure, tons	10.7	11.0	10.0
Total length	44 ft. 4 in.	53 ft. 2 in.	63 ft. 7 in.
With or without regeneration	Without	With	With

apparatus is furnished by two type-BBC compressors. The total weight of the express locomotive is 118 tons and the freight locomotive 133 tons. The mechanical parts of the locomotives are under construction by the Swiss Locomotive Works at Winterthur.

In the arrangement of the electrical apparatus, all of the principal control equipment is so related to the transformer as to form a complete group which can be installed or removed through a hole in the roof. The tank of the transformer is designed for the support of the apparatus, its sides being constructed of strong plates reinforced with angle irons. The transformer oil is circulated by means of a pump through cooling pipes mounted on the side walls of the cab. This arrangement is said to provide a transformer system no heavier than one involving air cooling. The transformer, of 1,730-kva. capacity, lowers the voltage from 15,000 or 7,500 to 1,325. Its weight without the cooling coils and pump is 27,560 lb.

Current is taken from the line through two independent pantographs. After flowing through the lightning arrester installed on the roof, it passes through the high-tension circuit breaker and the transformer, thence by way of the motors and the trucks to the rails. The high-tension breaker is installed in an opening provided in the roof.



TRAIN LEAVING THE ST. GOTTHARD TUNNEL AT AIROLO

The four motors of one locomotive form two groups, connected in parallel, the two motors of each group being in series. The series connection is permissible because the motors are mechanically coupled. The motors are of the series compensated type, with a commutating field. Between the armature inductors and the commutator are resistors so placed as to be well ventilated. Regulation of speed is by variation of voltage in eighteen steps from 237 to 1,325 volts (for two motors in series). The voltage is varied by means of an ingenious commutator resembling a storage battery regulator, but with auxiliary switches which break the local circuit as the brushes pass from contact to contact. The locomotives are provided with multiple-unit control so that two can be operated as a unit.

An essential feature of these locomotives will be provision for electric braking for the purpose of reducing brakeshoe wear and the consequent dissemination of iron dust in and about the machine. It was not considered necessary to provide for return of power to the line. A sample locomotive has been provided with resistors, shown mounted on the roof in one of the illu trations, which absorbs on down grades the direct-cu rent power produced by the motors. The location of th resistors was selected to provide maximum natural ve tilation. If this type of braking process is satisfacto other locomotives will be similarly equipped.

The locomotives mentioned above are designed for th Erstfeld-Chiasso section of the St. Gotthard electrific tion, which will be next equipped. For this work th passenger locomotive must climb a 2.6 per cent gra with a 330-ton train at 22 and 31 m.p.h., and the freig locomotive must draw the same load up this grade 31 m.p.h. or 473 tons at 22 m.p.h. The power develope on the grades is 2,500 hp., with tractive efforts for th two locomotives respectively of 27,500 lb. and 37,400 On the maximum grade the values are 35,200 lb. a 48,400 lb.

NEW TYPE OF LOCOMOTIVE WITH INDIVIDUAL DRIVE OF AXLES

A locomotive which has been in experimental use the Loetschberg line for nearly two years is equipp with two varieties of individual axle drive. This for of drive has not yet been generally employed in Euro although it has been popular in America. In Euro the preference has been for few motors of large pow rather than many of small power. The designers this experimental locomotive recognized as ideal t form of drive used on tramway cars, as it gives a u form rather than a pulsating transmission of torqu and they applied it here in principle. They found possible to design a single-phase machine with 300 per axle for a speed of from 22 to 28 m.p.h. A mot of this kind weighs, with gears, about 13,200 lb. App cation of direct drive of this sort is difficult, howeve for express train locomotives. For European conditio three motor axles are in general sufficient, while for t greatest exigencies in express traffic, four driving axle with 700 to 800 hp. each, are sufficient. This is too mu for tramway drive, but even if it were not the nece sary speed would be too high.

The present experiment in drive is due to Chief E gineer Tschanz of the Federal Railways. One axle the locomotive has a drive invented by him, while second has one designed by Brown, Boveri & Cie.

Both of the schemes involve the placing of the gea outside the driving wheels to insure the maximum spa for the motor. In the Tschanz plan the motor is "ela tically mounted" on the locomotive underframe. T motor torque is transmitted through an intermedia axle located on about the same level as the motor ax and nearly over the driving axle. Thence the torque transmitted by means of gears to another axle carri inside the hollow driving axle to a flexible drivi coupling on the far side.

In the "BBC" drive the motor is mounted on the loc motive frame directly above the driving axle. T motor torque is transmitted by means of pinions, o on each end of the axle, to gears carried by the loc motive frame and located outside of and directly opp site the driving wheels. Thence it is transferred ov to the latter by means of an ingenious link and ge coupling which permits relative vertical movement the driving gear and the locomotive driving wheel. Wi this design it would be possible to use a motor as lar as 1,000 hp. The external arrangement of gear is sa to be particularly advantageous with respect to insp tion.

The experimental locomotive has given satisfaction in ervice and both types of drive have worked well.

Among other interesting recent Swiss locomotives is he new three-phase machine built by Brown, Boveri Cie. for the Burgdorf-Thun line. This is of extremely imple mechanical construction, with two swivel trucks, ach carrying one motor; a design which could be dopted on account of the small power capacity reuired. In the middle of each truck is a 260-hp. motor eared to a jackshaft, which, through cranks and conecting rods, drives the two axles. As in other drives f this general type the driving pin on the crank works a vertical slot in the center of the connecting rod o as to permit some vertical movement of the pin with elation to the connecting rod, thus providing for dislacement of the truck springs.

The electrical equipment is designed for the mean ne voltage of 750, but provision is made for an increase o 1,500. The frequency is 40 cycles per second. Four peeds are provided by means of pole changes as folows: 8.7 m.p.h., 12 poles; 12.4 m.p.h., 8 poles; 18 m.p.h., poles; 27.3 m.p.h., 4 poles. The respective tractive fforts on an hourly rating are 21,300, 15,000, 10,200 nd 6,800 lb. The rotor is of the "squirrel-cage" variety, egulation of starting voltage applied to the stator being rovided by means of two auto-transformers connected "V," with taps for various voltages from 214 to 900. t the lower two speeds the stator is "delta-connected"; t the higher speeds, "star-connected." It has two indeendent windings to permit the changing of the number f poles.

The locomotive is provided with a roomy cab which is vailable for the auxiliary apparatus, the smaller parts f which are inclosed in cabinets along the walls. Proecting from each end of the cab is a hood which covers he motors and transformer and commutating switch. he total weight of the machine is 96,600 lb., almost qually divided among the four axles.

The Burgdorf-Thun Railway, which is the most imortant three-phase line in Switzerland, has also ordered wo motor cars of an entirely new type from the Oerikon works. As this article, however, deals with locootives, details of the motor car will not be given here.

The accompanying illustrations of typical Oerlikon nd "BBC" locomotives have been selected to indicate he present trend in Swiss design.

Hunters Find a Canvas Back

A RAILWAY company that had been accustomed to the operation of the old style non-ventilated motor laced in service a number of safety cars equipped with e modern light-weight ventilated type of motor. ecently this company had several cases of roasted rmatures develop on these motors and there was no pparent cause for the trouble, as all motors were operting under the same service conditions.

About this time, in connection with service tests that ere being made on these cars, the temperatures of the otors were taken at the end of the test run, and to e surprise of the testing force it was noted that the mperature of the No. 2 armature on one of the cars as 35 deg. above that of the No. 1 armature. It was first thought that perhaps the No. 1 motor was cut t by the operator due to some temporary trouble, but is was not the case. It was then intimated that probly there was some error in the car wiring that had erloaded the No. 2 motor, but the car wiring was und to be O.K. Finally, during the making of a careful inspection of the motors, it was discovered that the No. 2 motor had a strip of canvas under the ventilating covers at the air outlet of the motor frame, thus choking the ventilation of this motor and accounting for the dangerous operating temperatures.

When the carhouse men were questioned it was found that on account of the heavy snows all motors had been closed in the above manner to keep out the snow and water during the winter season. This canvas was supposed to be removed from all motors when the warm weather set in, but apparently this frame was missed, and this carelessness on the part of the carhouse men was responsible for the roasted armatures.

This incident helped to drive home a very important point regarding the keeping of records on armature failures, as it was suggested that if such information had been available on this property the cause of the trouble might readily have been run down by tying up all armature failures to a particular motor frame in position No. 2 on a definite car.

New Locomotives in Service on Pacific Electric Railway

THE Pacific Electric Railway has recently purchased from the Westinghouse Electric & Manufacturing Company two 1,000-hp. locomotives to be used in its interurban freight service. The volume of this traffic has been steadily increasing, especially on the heavy hauls from Los Angeles harbor to the city of Los Angeles, and these two locomotives, together with the fifteen original ones, were needed to handle the traffic.

NEW INTERURBAN FREIGHT LOCOMOTIVE ON THE PACIFIC ELECTRIC RAILWAY

The new locomotives, weighing about 129,000 lb., are 3,000 lb. heavier, although similar in class to those already in use. They are of the steeple double-truck type, having four 250-hp. motors.

The principal improvement is the use of two air compressors having a combined capacity of 150 cu.ft. of air per minute, compared with a total capacity of 100 cu.ft. per minute of the compressors on the older locomotives. The improved and larger compressors are of the three-stage intercooler type driven by a compound dynamotor.

CHARACTERISTIC DATA FOR LOCOMOTIVES

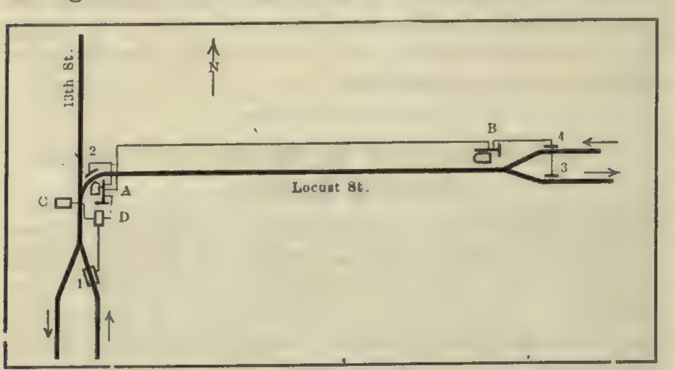
Maximum tractive effort	30,000 lb.
Normal tractive effort at 18 m.p.h.	21,000 lb.
Continuous tractive effort with forced ventilation	11,520 lb.
Maximum trailing load	1,200 tons
Average trailing load	600 tons
Maximum speed on level with 600-ton load	25 m.p.h.
Maximum speed on 4 per cent grade with 600-ton load	10 m.p.h.

Combined Signal and Switch Installation

Somewhat Novel Equipment Consisting of an Electric Track Switch Operating in Conjunction with Block Signals on a Single Track Installed by the Terre Haute Company

AMONG the latest additions to the equipment of the Terre Haute Traction & Light Company of Terre Haute, Ind., is an electrically operated track switch which works in connection with a block of automatic signals.

As is indicated in the accompanying diagram, a line of cars runs north and south on Thirteenth Street through a short block of single track that is not signaled. At the corner of Thirteenth and Locust Streets a single-track line turns east on Locust Street. This block is provided with Nachod signals which prevent opposing movements through the block but permit several cars to follow at the same time. A northbound Thirteenth Street car drifting under the current selective contactor 1, which is located about 75 ft. back of the switch point, will not operate the block signals on Locust Street, but will insure the switch point being thrown for the straight track on Thirteenth Street. In order to throw the switch point for the diverging route into Locust Street, a car passing under the selective contactor 1 must apply two or more points of power. This throws the switch point for the turn into Locust Street and also sets the signals. Signal B, at the opposite end of the block on Locust Street, will indicate "Stop" and signal A, located an observation distance ahead of contactor 1, will then show "Permissive." As the car leaves the block at the other end on Locust Street, in passing under contactor 3 it restores both signals to the normal neutral or clear indication.



SWITCH AND SIGNAL INSTALLATION IN TERRE HAUTE

A, B, Signals. 3, 4, Signal contactors non-directional shunt type. 2, Signal contactor uni-directional shunt type. 1, Contactor for switch and signal, non-directional series type. C, Ground box for switch. D, Circuit changer for switch and signal.

A Locust Street car coming west will set signal A at "Stop" and prevent an opposing movement while passing under contactor 4. Signal B will also be set at "Permissive." As the car passes under contactor 2 it will clear the block, providing, of course, that a second car has not followed the first at the permissive signal B, in which case the signal will not be cleared until the same number of cars have passed southward out of the block under contactor 2 as have entered the block under contactor 4. Contactor 2 is inoperative when traversed in the opposite direction. The signals give indication by lights and disks of the same color for each indication.

The Cheatham switch used consists of a powerfu double solenoid having a single armature so connecte to the switch point as to throw it to either positio according to which coil is energized. Each solenoid o this switch will exert a pull of over 400 lb. Thes solenoids are installed in a waterproof cylinder house in a ground box with a removable cover. A relay o circuit changer is mounted on a pole near the switch The contactor is of the series type without movin parts, the front and back contacts on the armatur being connected respectively to the two switch operating solenoids. The current selective relay is adjuste so as not to pick up its armature with the current use for light, heaters and the compressor motor, but it wi pick up on application of one or two points of powe through the car motor. The circuit changer box als contains a time limit relay which will open the circui to the operating solenoids and thus prevent their burning out if the car stands on the contactor for a perio of more than five seconds. In operating with th Cheatham switch the motorman need not observe th switchpoint, but will always draw power under th contactor for the diverging route and will drift fo the straight route irrespective of the previous position of the switchpoint.

Should it be desirable to signal the single-track bloc on Thirteenth Street contactor 1 may still be connecte so that cars drifting under it will throw the switc and set the signals for Thirteenth Street and cars usin power under this contactor will throw the switch an set the signals for Locust Street. With the installation of this equipment every important switching poin on this property has been equipped with the heavy typ of switches and locks. The signals used were furnishe by the Nachod Signal Company, Inc., and the switche by the Cheatham Electric Switching Device Company The installation was supervised by an engineer fro the manufacturers.

Spring Snow in Winnipeg

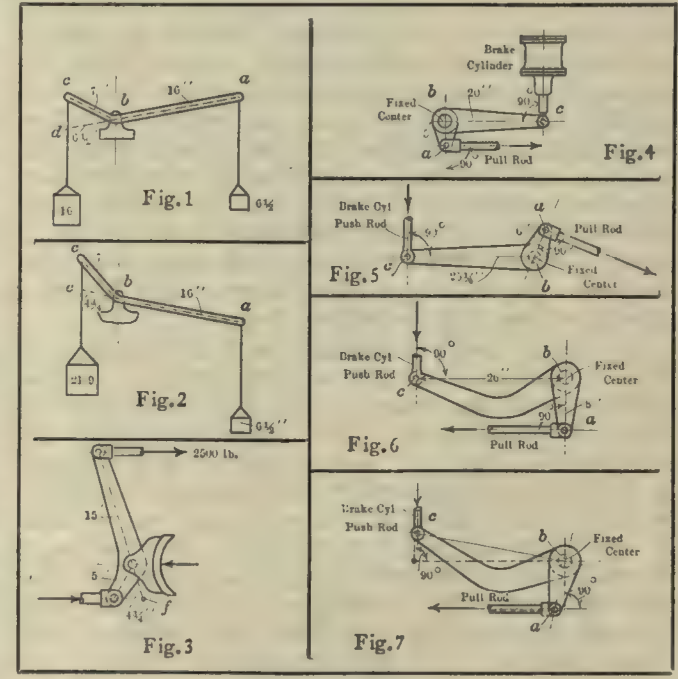
SNOW CONDITION IN WINNIPEG

THE accompanying illustration shows the condition with which the Winnipeg (Canada) Electric Rail way is contending this spring. The snowstorm whic caused the snow banks shown fell on March 16, and th photographs were taken on March 29, 1921. There ha been no thaw or additional snowfall between those dates The snowfighting equipment used by this railway wa described in an article in the ELECTRIC RAILWAY JOURNAL for Feb. 19, 1921. It rendered efficient service i combating this belated storm.

Determination of Forces on Eccentric Levers and Bell Cranks[*]

Methods for Determining the Forces Developed by Eccentric Levers and Standard Bell Cranks Are Given, Also General Methods of Applying the Leverage Rule, Together with Simplified Solutions and Rules for Solving Brake Leverage Problems by Using the Proportional Lengths of Levers Instead of Their Actual Length

BY H. M. P. MURPHY



COMMON FORMS OF ECCENTRIC LEVERS AND BELL CRANKS

Figs. 1 and 2—Diagrams to illustrate forces developed.
Fig. 3—Practical form of eccentric lever.
Figs. 4, 5, 6 and 7—Various forms of bell cranks.

THE eccentric type of lever was previously described and illustrated in the first article of this series published in the ELECTRIC RAILWAY JOURNAL for Jan. 15, 1921. It may always be treated as a modified form of the straight-line lever when the subject of force multiplication is involved, providing that the following instructions are carefully observed. The reasons for this will be made apparent by the subsequent illustrations and examples.

When an eccentric lever is in the exact position in which it is to perform its duty, the forces acting upon it may be determined thus: Extend the straight line, passing through the middle point and one end point of the lever, till it meets the line of action of the force acting at the other end point, then consider this straight line as a simple straight-line lever and apply the same rules to it as to any straight-line lever. The three points of such a lever are, of course, the middle point, and the end point of the eccentric lever through which the straight line passes, and the point at which this line meets the line of action of the force acting at the other end point of the eccentric lever. It is important to note here that the forces acting on an eccentric type of lever must be parallel, just as in the case of the straight-line lever.

FORCES DEVELOPED BY ECCENTRIC LEVERS

In order to illustrate the use of the preceding rule, consider the eccentric lever shown in Fig. 1 and let a weight of 6½ lb. be suspended from the point *a*, then to find the weight which must be suspended from the point *c* (*i.e.*, to find the force developed at the point *c*) in order to produce equilibrium, draw a straight line through the points *a* and *b*, and extend it till it cuts the line of action of the left-hand weight at a point *d*. Now consider the line *a b d* as a straight-line lever, then by applying the "Leverage Rule" and considering the middle point, *b*, as the fulcrum,

$$\text{The desired force} = \frac{\text{the known force}) \times (\text{the lever arm of the known force})}{\text{the lever arm of the desired force}}$$

or

$$\text{Force acting at } d \text{ (or } c) = \frac{(\text{Force acting at } a) \times (\text{Lever arm of force at } a)}{\text{Lever arm of force at } d \text{ (or } c)}$$

$$\text{Force acting at } d \text{ (or } c) = \frac{6.5 \times 16}{6.5} = 16 \text{ lb.}$$

The length of the lever arm, *b d*, is, of course, obtained by measuring the actual rigging or a scaled drawing. The force acting at the point, *b*, may also be found by the same method, thus, applying the "Leverage Rule" and considering the point *d* as the fulcrum,

$$\text{Force acting at point } b = \frac{6.5 \times 22.5}{6.5} = 22.5 \text{ lb.}$$

which is correct for force at *a* plus force at *d* must equal force at *b* (see Article 1), that is 6.5 + 16 = 22.5 lb.

Now suppose that the eccentric lever shown in Fig. 1 is swung through a slight angle, about the point *b*, and is thus brought into the position shown in Fig. 2, and let it be required to find what weight (that is, force) must be applied at *c* to balance a weight of 6½ lb. applied at *a*. To solve this problem, draw a straight line through the points *a* and *b* and produce it till it intersects the line of action of the left-hand force at the point *e*. It will be readily seen from the construction of the lever (shown in Figs. 1 and 2) that the line *b e* is much shorter than the line *b d*, consequently a greater force must be applied at the point *c* to balance the 6½-lb. weight applied at *a* in the case under consideration than in the preceding example. To find the force acting at

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[*] This is the fourth of a series of articles on forces developed in rake riggings. Others appeared in the Jan. 15, Feb. 19 and March 19 issues of this paper.

c, Fig. 2, consider the middle point, *b*, of the straight-line lever, *a b e*, as the fulcrum, then,

$$\text{Force acting at } e \text{ (or } c) = \frac{6.5 \times 16}{4.75} = 21.9 \text{ lb.}$$

and in this case the force acting at *b* is 28.4 lb.

IMPORTANT FACTS DEDUCED FROM EXAMPLES

The preceding examples show that when considered in some specified position the forces acting on an eccentric lever may be easily found by the simple method outlined in the first part of this article, but that, although the force acting at one point of an eccentric lever may be constant, the forces acting at the remaining points depend not only on the dimensions of the lever but also on the position of the lever. It should be noted here that as previously pointed out, this is not the case with the straight-line type of lever, the forces acting on which are entirely independent of the position or angle of the lever, and which, therefore, always bear the same fixed relation to each other, this relation depending only on the dimensions of the lever. For these reasons it is obvious that an eccentric type of lever is an extremely undesirable form to use in brake riggings, because as the brakeshoes wear, the leverage ratio will continually change, either becoming greater or less than the amount desired.

A practical form of eccentric lever is illustrated in Fig. 3. This type is found most frequently in traction service where the clearances are small and therefore where it is sometimes quite impossible to use the straight-line lever. As an example, let it be required to find the force delivered to the brakeshoe, in Fig. 3 when a force of 2,500 lb. acts on the pull rod attached to the upper end point of the lever. By drawing a straight line as indicated through the upper end point and the middle point of the lever and continuing it till it meets the line of action of the lower end force, and then measuring the length of this line (4¾ in.), and considering the point of intersection *f* as the fulcrum, we have:

$$\text{Force on brake beam} = \frac{2{,}500 \times 19.75}{4.75} = 10{,}395 \text{ lb.}$$

PRINCIPLES OF BELL CRANKS

It is important to state here that an eccentric lever must not be confused with the form of force-multiplying device known as a "bell crank," the standard form of which may be defined as follows:

A standard bell crank is a force-multiplying device which is adapted to maintain a fixed relation between the forces involved, and which consists of two rigid arms or bars securely connected with each other through the medium of a shaft. The standard form of bell crank must always be so constructed and installed that both arms will be acted upon at their free ends by independent forces which maintain constant directions, such that their lines of action will simultaneously form 90-deg. angles with the center lines of their respective arms.

It will be readily seen from the preceding definition that the forces acting on a bell crank of standard design are parallel only when the shaft center and the two end points lie in the same straight line. Bell cranks of various forms are illustrated in Figs. 4, 5, 6 and 7, where it will be noted that the center line of each arm is simply a straight line drawn through the end point (or pin center) of the arm and the shaft center, whether the arm is straight or curved between these points. It will also be seen that the angle made by the center lines of the two arms may have any value whatever, as shown in Fig. 5, but usually for railway brake riggings this angle is given a 90 or 180 deg. value because of the location of the brake cylinders on locomotives, where the bell crank is most frequently used.

In this connection it should be pointed out that as the force action on the shaft of a bell crank is quite complicated and as the shaft is always supported by a fixed bearing, only the two forces acting at the free ends of the arms will be considered in the following discussion. The bearing forces are, of course, of no importance in any problem involving the subject of braking power. It should, moreover, be noted that a standard bell crank will always maintain a fixed relation between the forces acting on it, regardless of the position of the crank, providing that the lines of action of the various forces remain parallel to their own standard directions. Thus, if in Fig. 6, a given force be applied to the brake cylinder push rod, a certain definite force will be developed on the pull rod, and this force will remain constant no matter what angle the bell crank may be swung through, providing that the line of action of the push rod force remains vertical and the line of action of the pull rod force remains horizontal, as shown in Fig. 7. Of course, in practice it is impossible always to maintain these exact ideal conditions, but when they are obtained approximately the forces concerned will differ so slightly from the desired values that the variations produced need not be considered. This is also true of the "straight-line" type of lever.

DEFINITION OF "LEVER ARM" FOR A STANDARD BELL CRANK

The fixed, or shaft, center of a bell crank should always be considered as the fulcrum, or point about which the crank turns, for the end forces are the only ones which it is necessary to determine in braking power computations. Keeping this fact in mind the following definition will be readily understood:

The lever arm of a force acting at the free end of one of the arms of a standard bell crank is simply the straight line distance between the fulcrum (*i.e.*, shaft center) and the point of application of the specified force.

In order to obtain a clear understanding of the preceding definition, it will be well to refer to Figs. 4, 5 and 6, and to note that in each case when the point *b* is considered as the fulcrum the lever arm of the pull rod force is the line *b a* and the lever arm of the brake cylinder force is *b c*.

If the definition of the term "lever arm" for a standard bell crank is kept clearly in mind and if either one of the two end forces acting on the crank is known, the remaining force may always be found by aid of the "Leverage Rule" which was previously given for straight line levers (see article 1); that is,

$$\text{The desired force} = \frac{\text{(The known force)} \times \text{(The lever arm of the known force)}}{\text{The lever arm of the desired force}}$$

To illustrate the method of determining the forces acting on a standard bell crank let us consider the standard bell crank shown in Fig. 4 and let it be required to find the force acting on the pull rod when the dimensions are as indicated and a 14-in. diameter brake cylinder is used, the air pressure being 50 lb. per square inch.

The table previously published in article 3 of this series gives the total force on the push rod as 7,697 lb., then by applying the "Leverage Rule" and considering the shaft center (or middle point) as the fulcrum,

$$\text{Force on pull rod} = \frac{(\text{Force on push rod}) \times (\text{lever arm of force on push rod})}{\text{lever arm of force on pull rod}}$$

$$\text{Force on pull rod} = \frac{7{,}697 \times 20}{5} = 30{,}788 \text{ lb.}$$

Now consider the standard bell crank shown in Fig. 5, and let it be required to find the force acting on the pull rod, when the force on the brake cylinder push rod is equal to 6,786 lb.

To solve this problem, consider the shaft center as the fulcrum, then, by applying the "Leverage Rule,"

$$\text{Force on pull rod} = \frac{6{,}786 \times 25.25}{6} = 28{,}558 \text{ lb.}$$

Next consider the standard bell crank shown in Figs. 6 and 7 and let it be required to find the force acting on the pull rod, when a force of 10,053 lb. acts on the brake cylinder push rod.

To solve this problem, consider the shaft center as the fulcrum, then, by applying the "Leverage Rule,"

$$\text{Force on pull rod} = \frac{10{,}053 \times 26}{8} = 32{,}672 \text{ lb.}$$

The preceding discussions of levers and bell cranks have shown that in order to determine the forces acting on (or developed by) these types of multiplying devices it is merely necessary properly to apply the "Leverage Rule" given in article 1. Consequently, it will now be well to restate this rule in a more general way and to give a brief summary of the simple but important considerations involved in its correct use.

When the force applied at one of the points (or pin centers) of a lever or bell crank is known and it is desired to find the force developed at a second point, consider the third (*i.e.*, remaining) point as the fulcrum, then the desired force may be found by multiplying the known force by its own lever arm and dividing this product by the lever arm of the desired force.

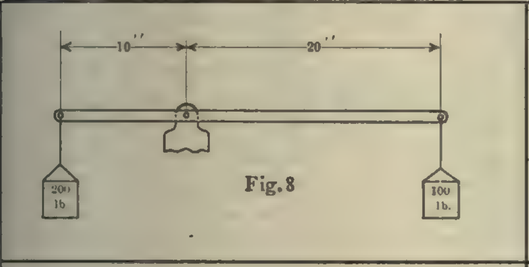


Fig. 8

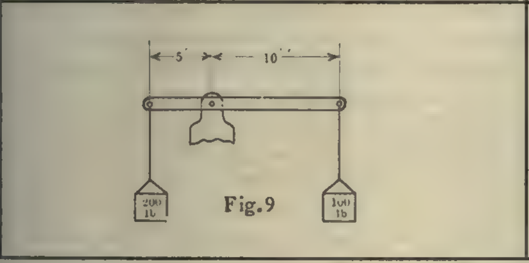


Fig. 9

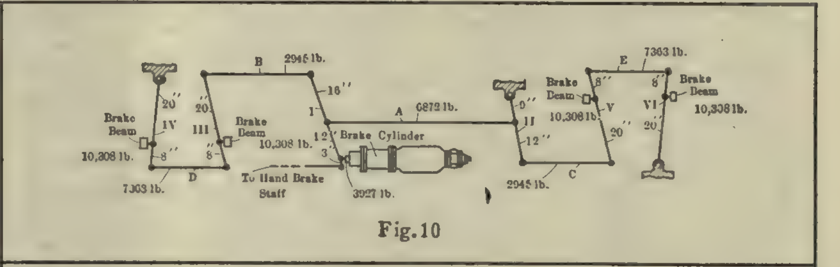


Fig. 10

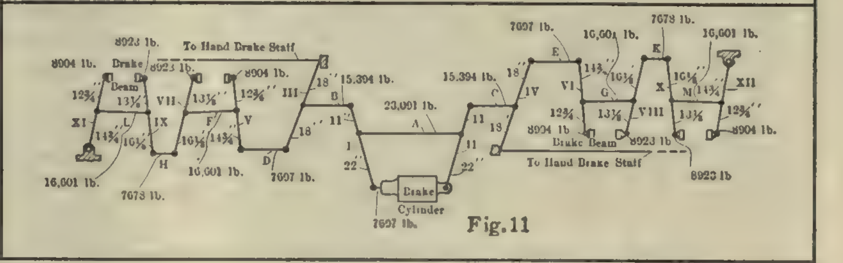


Fig. 11

FIGS. 8 AND 9. DIAGRAMS TO ILLUSTRATE LEVER RATIOS. FIGS. 10 AND 11. BRAKE RIGGING DIAGRAMS

This rule may, as previously stated, be expressed in the following mathematical form:

$$\text{The desired force} = \frac{(\text{The known force}) \times (\text{the lever arm of the known force})}{\text{the lever arm of the desired force}}$$

In order properly to apply the "General Leverage Rule" it is merely necessary to remember that the lever arm of any force always depends upon the location of the point considered as the fulcrum and is simply a straight-line distance which must be measured in the manner described in each case. It is also essential to note that the shaft center of a bell crank is the only point which it is ever desirable to select as a fulcrum, but that any one of the three points of a lever may properly be considered as a fulcrum whether there is a fixed point or not.

Attention should, moreover, be called to the fact that the "General Leverage Rule" is based on the assumptions that the three forces acting on a lever are always parallel to each other and that each of the end forces acting on a bell crank remains parallel to its standard direction. It is, therefore, essential that these conditions be fulfilled as closely as possible in practice, in order that the forces concerned may bear the proper relations to each other. Slight variations from this desired state of affairs are always met with in actual constructions, but the degree of variation is so small in all good designs of brake riggings that it may be neglected.

LEVER RATIOS AND SIMPLIFIED METHODS FOR THE SOLUTION OF BRAKE LEVERAGE PROBLEMS

In all of the preceding discussions of the subject of leverage the actual dimensions of each lever and bell crank were always given when the forces developed were required, but obviously this is not absolutely necessary, as it is simply the comparative lengths of the lever arms that are essential: For example, as shown in Fig. 8, if a weight of 100 lb. is suspended from the end point of a lever at a distance of 20 in. from the middle point, a force of 200 lb. will be developed at the other end point, if it be located at 10 in. from the middle point. It is also equally clear, as indicated in Fig. 9, that if a weight of 100 lb. act at one end point of a lever at 10 in. from the middle point, a force of 200 lb. will also be developed at the other end point if it be located at 5 in. from the middle point. These facts may be demonstrated by aid of the "Leverage Rule" as follows:

In the first case:

Weight on short arm =

$$\frac{100 \times 20}{10} = 100 \times \frac{20}{10} = 100 \times 2 = 200$$

And in the second case:

Weight on short arm =

$$\frac{100 \times 10}{5} = 100 \times \frac{10}{5} = 100 \times 2 = 200$$

It is therefore perfectly obvious that the relation existing between any two forces acting on a lever depend only on the comparative lengths of the lever arms concerned; that is, on the ratio of one of the lever arms to the other. Consequently it is quite common practice to speak of a lever as being divided in a certain ratio if it is distinctly understood that a certain definite point is considered as the fulcrum. When using this expression (*i.e.*, "lever ratio") it should, however, be emphasized that it is positively absurd to do so unless the assumed fulcrum be clearly specified; for example, the lever shown in Fig. 8 has a ratio of 2 to 1 when the middle point is considered as the fulcrum, a ratio of 3 to 1 when the left-hand end point is considered as the fulcrum and a ratio of 3 to 2 when the right-hand end is considered as the fulcrum. Much confusion is, therefore, apt to arise from an improper use of the term "lever ratio," and consequently it is strongly recommended that such an expression never be employed unless a positive means of reference is furnished, such as a sketch, when the ratio of one clearly specified lever arm to another may be mentioned without any possibility of confusion.

If the points mentioned in the preceding paragraph are kept clearly in mind, the following rules or laws will prove of much value in simplifying leverage problems.

First—When any two levers are divided in the same ratio with respect to two corresponding points considered as fulcrums these levers will also be divided in equal ratios with respect to all corresponding points.

To illustrate this, consider the levers, I and II, shown in Fig. 10, neglecting the 3-in. extension on lever I for the hand-brake attachment. These levers have the following ratios with respect to the corresponding points mentioned, considered as fulcrums:

With respect to the pull rod end:

$$\text{Ratio of lever I} = \frac{28}{16} = 1\tfrac{3}{4} \text{ to } 1$$

$$\text{Ratio of lever II} = \frac{21}{12} = 1\tfrac{3}{4} \text{ to } 1$$

With respect to the tie rod, *A*, or middle point:

$$\text{Ratio of lever I} = \frac{16}{12} = 1\tfrac{1}{3} \text{ to } 1$$

$$\text{Ratio of lever II} = \frac{12}{9} = 1\tfrac{1}{3} \text{ to } 1$$

With respect of cyl. end of I and fixed end of II:

$$\text{Ratio of lever I} = \frac{28}{12} = 2\tfrac{1}{3} \text{ to } 1$$

$$\text{Ratio of lever II} = \frac{21}{9} = 2\tfrac{1}{3} \text{ to } 1$$

Second—When all of the levers connecting with the right-hand truck of a car are divided in the same ratio with respect to similar points considered as fulcrum as the corresponding levers connecting with the lef hand truck, the sum of the forces delivered to the brak beams of one truck will always be exactly equal to th sum of the forces delivered to the brake beams of th other truck.

As an illustration of this again consider the brak rigging shown in Fig. 10, and compare all correspon ing levers with each other by considering similar poin as the fulcrums; for example, with respect to the middle points, the ratios are:

$$\text{Lever I } \frac{16}{12} = 1\tfrac{1}{3} \text{ to } 1 \qquad \text{Lever II } \frac{12}{9} = 1\tfrac{1}{3} \text{ to}$$

$$\text{Lever III } \frac{20}{8} = 2\tfrac{1}{2} \text{ to } 1 \qquad \text{Lever V } \frac{20}{8} = 2\tfrac{1}{2} \text{ to}$$

$$\text{Lever IV } \frac{20}{8} = 2\tfrac{1}{2} \text{ to } 1 \qquad \text{Lever VI } \frac{20}{8} = 2\tfrac{1}{2} \text{ to}$$

The levers I, III and IV, connecting with the lef hand truck, are divided in the same ratio with respe to similar points (the middle point being considere in each case as the fulcrum) as the correspondin levers, II, V and VI, respectively connecting with th right-hand truck. Consequently the sum of the force delivered to the brake beams of each truck will be th same. The work of solving this example may therefor be reduced about one-half, for after having found tha the sum of the forces delivered to the brake beams o the left-hand truck is equal to 10,308 + 10,308 lb. that is, to 20,616 lb., the sum of the forces delivered t the brake beams of the right-hand truck is also know to be 20,616 lb., by aid of the foregoing reasoning.

Third—When the live and dead levers on a truck ar all divided in the same ratio, with respect to simila points considered as fulcrums, the forces delivered t each of the brake beams will be equal to each other.

To illustrate this again consider the brake riggin shown in Fig. 10. Now the force delivered to the brak beam of lever III is equal to 10,308 lb. Consequentl as the truck levers III and IV are divided in the sam ratio with respect to similar points, the force delivere to the brake beam of lever IV will also be equal t 10,308 lb., this being determined by aid of the thir rule just given, instead of by the long method of calcula tion given in the third article of this series.

The construction shown in Fig. 11 may also be use to illustrate this principle, for although the ratios o the truck levers are not exactly the same they are s nearly alike that the slight variation is of no practica importance; thus, considering the middle points o levers V, VII, IX and XI as the fulcrums, the rati of each is:

$$\text{Lever V } \frac{14.75}{12.75} = 1.157 \text{ to } 1$$

$$\text{Lever VII } \frac{16.125}{13.875} = 1.162 \text{ to } 1$$

$$\text{Lever IX } \frac{16.125}{13.875} = 1.162 \text{ to } 1$$

$$\text{Lever XI } \frac{14.75}{12.75} = 1.157 \text{ to } 1.$$

Consequently, as the force delivered to the brake beam of lever V is equal to 8,904 lb., the forces delivered to the beams of levers VII, IX and XI are also known to be approximately equal to 8,904 lb. by aid of the third law in question. Of course if the ratios of the levers V, VII, IX and XI had been exactly equal, the forces delivered to each of the brake beams would also have been exactly equal. In all cases where the ratios of the truck levers are not equal, or very nearly equal, the short method just illustrated should not be used for their solution.

Fourth—When the two cylinder levers on a car are divided in the same ratio, with respect to similar points, the forces delivered to each of the end pull rods connected to them will be equal.

As an illustration of this, consider the cylinder levers I and II in Fig. 10. These levers have already been shown to be divided in the same ratio with respect to similar points, consequently, by the fourth law just stated, if a force of 2,945 lb. is delivered to rod *B*, the same force (2,945 lb.) will also be delivered to the rod *C*; this method will therefore considerably simplify the work otherwise required to obtain the same results.

Raising a 500-Ton Concrete Culvert

A Washout on the Lines of the Rochester & Syracuse Railroad Undermined the Entire Footing of a Culvert, Which Was Successfully Salvaged by Raising to Its Original Position

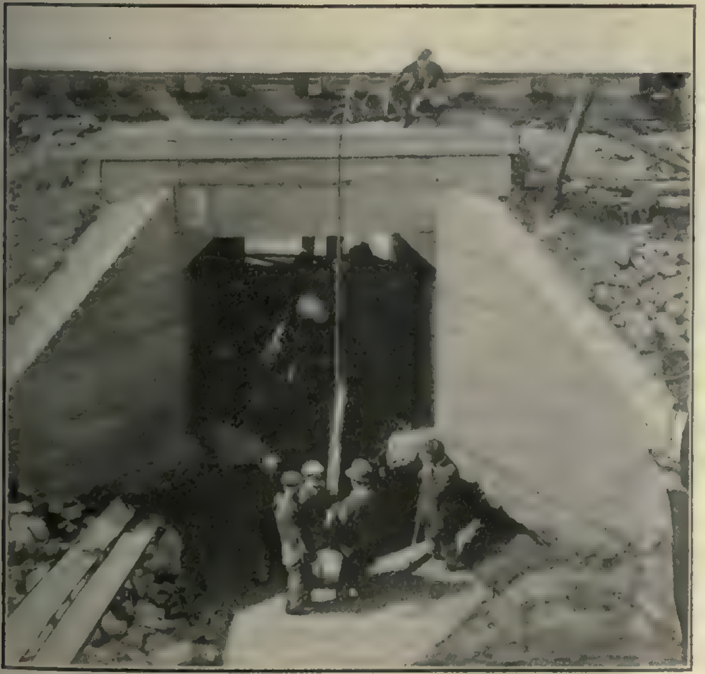
By D. E. Crouse
Chief Engineer Rochester (N. Y.) & Syracuse Railroad

THE accompanying illustrations show various stages of the work of salvaging a 500-ton concrete culvert which was washed out during the spring flood last year on the lines of the Rochester & Syracuse Railroad. The flood undermined the entire footing of the culvert shown and the south end of the culvert dropped about 4 ft. Before the high water subsided timbers were placed over the culvert to carry the railroad traffic, and as soon as the flood abated the normal stream was pumped out dry in order to make an inspection of the damage and ascertain how repairs could be made in an economical and satisfactory manner.

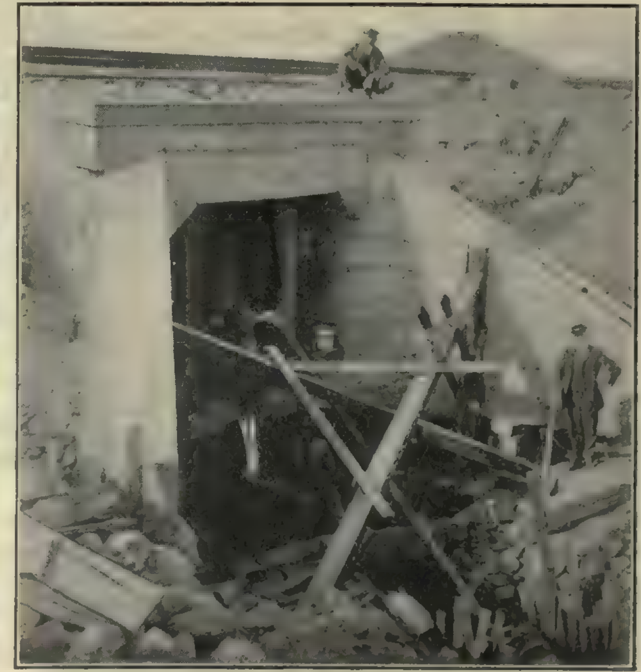
In order to keep the stream below the foundation level, a 3-in. centrifugal pump was used on the south side and a 4-in. centrifugal pump was placed on the north side of the bridge. As shown in one of the accompanying illustrations it was found that the entire footing was undermined and that the culvert was practically resting on the tips of the wing walls. As there were no fractures in the concrete, it was determined to try and jack the culvert up to its original position and then replace the foundation. Earth was excavated from the sides of the culvert in order to free the batter and jacks were then placed under the entire footing course. Approximately 900 tons capacity in jacks was used and the culvert was successfully raised to its original position without a single fracture developing in the concrete.

With the culvert in place a new footing course was run in and the jacks were removed. The repairs as outlined cost $650, and a replacement of the culvert which otherwise would have been necessary would have cost about $4,000.

BRIDGE IN PLACE, WITH NORMAL STREAM FLOWING THROUGH AFTER REPAIRS WERE COMPLETED



BRIDGE AFTER NORMAL STREAM HAD BEEN PUMPED OUT



WALLS EXPOSED AND JACKS PLACED READY FOR RAISING

Providence Engineers Discuss Electrification

At Joint Meeting of Providence Engineering Society and Providence Section A. I. E. E., C. C. Whittaker Outlines Electrification Status on a Number of Steam Railroad Properties

AN ILLUSTRATED lecture was given before the Providence Engineering Society, meeting in conjunction with the Providence Section of the American Institute of Electrical Engineers, on March 15, by C. C. Whittaker, railway engineering department Westinghouse Electric & Manufacturing Company. Among other things he said that studies on the substitution of the electric locomotive for steam motive power on a number of railroads have indicated that the resulting operating economies are sufficient not only to carry the charges on the capital investment but, in addition, the flexibility of the new type of motive power permits a greater volume of traffic to be handled over existing trackage and thereby obviates additional capital expenditure for increased trackage required with steam operation. In some cases it has been found that electrification will permit a road to care for a 75 per cent increase in tonnage with less capital expenditure than would be necessary for the expansion of steam facilities. In most cases the operating economies take care of the fixed charges on the increased capitalization.

In one case it was found that the gross investment for electric operation would be $2,939,000 as compared with $1,090,000 for steam, the net investment therefore being $1,849,000. However, the relative operating expenditures were estimated at $500,760 and $925,165, a saving in operation of $424,405. The return on the gross investment was 14.45 per cent and on the net investment 23.2 per cent. The costs of generated power were practically the same in this case under electric and steam operation, due to the fact that the location was in a coal mine district where coal was cheap.

A study made for a single-track Western railroad, where congestion was not involved and the general method of operation with electric power would be quite similar to that of steam, showed the following:

The section represented 133 route-miles of single track and provision was made for a 40 per cent increase in business. The gross investment for electric operation was $12,561,000 and for steam $3,599,260, or a net investment of $8,961,740. The relative operating expenditures were $3,826,381 and $5,530,217. The annual saving in operation was $1,703,836; the return on the gross investment, 13.6 per cent, and the return on the net investment, 19 per cent.

Mr. Whittaker then took up the various arguments in favor of electrification that have been advanced from time to time and briefly touched upon a number of typical installations. As to the matter of systems, he said that each system in use has reasons for its adoption, which fact is looked upon by broad-minded engineers as the one big factor that has caused the advancement of electric motive power to its present-day position. A decision as to system for a particular road or group of roads should be based upon engineering analysis from the standpoint of present and future requirements.

Among the interesting practical data which Mr. Whittaker gave were some relating to the Pennsylvania Tunnel and Terminal electrification in New York City. Here thirty-three 166-ton electric locomotives, each equipped with two 2,000-hp. motors, have handled all the passenger trains into and out of the New York terminal for the past ten years. They have made a total mileage of more than 7,000,000, with 64,437 miles per locomotive detention and 11,456 miles per minute detention, including mechanical, electrical and man failures. The locomotives require tire turning on account of worn flanges every 50,000 miles on the average, the actual figure varying between 25,000 and 100,000 miles. One engine recorded 142,000 miles between tire turnings. Third-rail shoes require replacement in summer on a 15,000-mile basis and in winter on a 3,000-mile basis. The original commutator has not been turned since it went into service. Motor brushes have lasted for 150,000 miles and motor bearings are renewed on a 30,000-mile basis. The maintenance of these locomotives over an extended period has cost approximately one-sixth that of the equivalent steam locomotives.

Annual Report of the A. E. Standards Committee

This National Clearing House for Technical Information Is Now a "Going Concern"—Contributions from Industrial Associations and Companies Interested Will Be Required to Supplement Dues

ALTHOUGH the annual report of the American Engineering Standards Committee will not appear in final form for some time, from advance galley proofs it is possible to summarize a few of the facts of electric railway interest which it will contain. The committee now comprises the following member bodies: American Electric Railway Association, American Institute of Electrical Engineers, American Institute of Mining & Metallurgical Engineers, American Society of Civil Engineers, American Society of Mechanical Engineers, American Society for Testing Materials, Electrical Manufacturers' Council, Electric Light & Power Group, Fire Protection Group, Gas Group, National Safety Council, Society of Automotive Engineers, and the United States Departments of Agriculture, the Interior, the Navy and War.

In the report the functions of the committee are stated to be: To unify methods of arriving at engineering standards; to secure co-operation among various interested organizations in order to prevent duplication of work and promulgation of conflicting standards, but not itself formulate standards; to act as an authoritative channel of co-operation in international engineering standardization; to promote in foreign countries a knowledge of American engineering standards; to collect and classify data on standards, and to act as a bureau of information regarding standardization.

The committee has now been actively at work for more than a year, although much of the time and effort so far have necessarily been spent on laying a basis for work. Prior to Dec. 31, 1920, three standards were approved, these bearing respectively the numbers 1, 2 and 3. Specifications and tests for portland cement were approved as "tentative American standards"; specifications for fire tests of material and construction were similarly approved, and certain pipe threads were approved as "American standard."

Several standards were submitted for approval, but had not been acted upon prior to the above date, as follows: As "American standard," the National Electrical Code; as "tentative American standards," a standard test for toughness of rock, a standard method for distillation of bituminous material suitable for road treatment; a standard method for sampling coal; specifications and tests for portland cement; and as "recommended American practice," safety code for head and eye protection. A large number of projects for which sponsorships have been arranged are under way, including such items as rating of electrical machinery, ball bearings, gears, machine tools, nuts and bolt heads, pipe flanges and fittings, screw threads, castings, various safety codes, etc.

The American Engineering Standards Committee, usually referred to as the main committee, composed of forty-seven members, is solely an administrative and policy-forming body and does not concern itself with technical details. Each industry, or branch of industry, is wholly autonomous in its standardization work, the function of the main committee being merely to assure that each body or group concerned in a standard shall have an opportunity to participate in its formulation, which is in the hands of a working committee, technically called a "sectional committee," made up of representatives designated by the various bodies interested, together with other specifically qualified individuals. The main committee must approve the personnel of each sectional committee as being authoritative and adequately representative of the various interests concerned.

Each sectional committee is organized by, and is under the leadership of, one or more of the principal bodies interested. Such bodies are known as "sponsors." The committee has decided that if it is the desire of any industry to have a general committee, representative of the industry as a whole, as a means of developing and correlating the standardization work of the industry that arrangement will be eminently satisfactory.

As to publication of the standards, individual standards are published by the sponsor bodies, but provision is made for the publication collectively of standards approved by the committee and also for the original publication of individual standards upon request or approval of the sponsor bodies. The committee acts as distributing agent for all standards approved by it, or which have been submitted to it for approval.

At present the work is supported by the dues of the member bodies, $500 for each representative on the main committee. Exception is made in the case of government departments, pending the enactment by Congress of legislation which is necessary to enable the departments to contribute their share of the expenses of the committee. As the present dues are not sufficient to support and develop the work the committee will seek contributions from industrial associations and companies interested in standardization.

It is planned that the committee office shall serve as a bureau of information on engineering standardization, keeping in touch with what is going on in connection with this subject, both in America and abroad.

The American Society of Mechanical Engineers is engaged upon a revision and enlargement of its power test codes issued in 1915. Nineteen codes are being drafted to cover all classes of power plant machinery. Nineteen committees are engaged, supervised by a main committee of twenty-eight, of which Fred R. Low of New York, editor of *Power*, is chairman, and Prof. Clifford B. LePage of Stevens Institute of Technology, Hoboken, is secretary.

Why Alter the Standard Safety-Car Design?

Advantages and Disadvantages of Double-Door Type of Construction with Longer Platforms Are Discussed and Data Are Given Regarding Power Consumption and Passenger Interchange Time.

BY J. C. THIRLWALL
Railway and Traction Engineering Department, General Electric Company, Schenectady, N. Y.

A NUMBER of articles and letters have recently appeared in the ELECTRIC RAILWAY JOURNAL discussing at considerable length the desirability of changes in the design of the standard safety cars. Some operators seem to feel that double doors, permitting simultaneous entrance and exit, are necessary, and that a wider aisle is desirable. Apparently the thought behind these suggestions is that the use of a double-door car with bigger platform and aisle space will result in a better schedule through a shortening of the time of passenger interchange. Other operators vigorously dispute this claim, including one, at least, who has made the experiment, and who now uses but one of the two doors with which his one-man cars are equipped.

There is unquestionably a feeling of irritation produced in the minds of passengers waiting to board a car, if they are held up twenty or thirty seconds while fifteen or twenty people are leaving a single-door car, particularly in rainy weather, and actual complaints from such people or the fear that such complaints would occur have without doubt influenced those operators who have insisted on changes in the standard design and dimensions. For points of heavy interchange, particularly on streets where several lines operate in common and headways are extremely short, the theory of the simultaneous egress and entrance of passengers is alluring, and the temptation is strong to increase the standing space so as more comfortably to handle rush-hour crowds. But the actual effect of such changes, in spite of the Madison experience, is problematical, and they do involve penalties which are not at all problematical.

INCREASED WEIGHT WILL REQUIRE LARGER MOTORS

The essential features of the original Birney design were the dimensions of the body, the use of a low-wheel, long wheelbase truck, and the elimination of every pound of unnecessary weight. Some strengthening of structural parts was found desirable after the first cars had been tried out in service. Northern cities had to use more heaters than those in the South, and more interior sheathing, and required 26-in. wheels instead of 24-in. wheels to provide winter clearances. But minor changes such as these have not altered the fundamental design, although they have increased the weight considerably above what it was at first, and that thereby increased first costs and decreased the schedule possibilities. But the car builders can still build in quantity for stock and give the industry the benefit of the economies of production.

But if the car bodies are to be lengthened and widened to varying degrees, the trucks may have to be changed to conform and weights may easily increase to a point where larger-size motors will be required to meet heavy service in the larger cities. Under these conditions, standardization and quantity production will be impossible; prices will inevitably increase, and the sale of cars on car trust certificates will be impracticable.

So much for the general objections to fundamental changes; now for the specific ones. According to the article in the March 12, 1921, issue of the ELECTRIC RAILWAY JOURNAL, the double-door cars in Madison weigh 2,600 lb. more than the standard cars originally used there, and it costs real money to carry around this extra weight. Energy consumption goes up almost in direct proportion to the tons moved, maintenance of equipment and of track are both increased and where we used to say "5 cents per pound per year," we can today say that for many roads it costs 10 cents a year for every pound of weight in their regularly used cars.

Of these items, power is the largest and the one that can be figured the closest. Data recently compiled by the American Electric Railway Association giving statistics on power costs from representative railway power stations show that for ten large plants ranging from 15,000 to 87,000 kw. in capacity the average operating cost per kilowatt-hour is 1.08 cents. Twelve smaller stations of from 4,500 to 13,000-kw. capacity show an average cost of 1.62 cents. These figures do not include fixed charges.

Repeated tests of safety cars in frequent-stop city service indicate an average motive-power consumption of 140 watt-hours per ton mile (including passenger load) at the car, or about 200 watt-hours at the alternating-current switchboard in the power station. Figures compiled by the writer, and presented in an article published in the Oct. 2, 1920, issue of the ELECTRIC RAILWAY JOURNAL, covering 1,255 safety cars operated by thirty-eight railways, showed an average annual mileage per car owned of 42,500. The annual energy consumption, on this mileage figure, per ton of weight would be $0.2 \times 42{,}500$ or 8,500 kw.-hr., or 4.25 kw.-hr. per pound. At the lower cost in the above figures, each pound of weight in the cars costs 4.6 cents per year for power; at the higher rate, which is nearer the average, I believe, it costs 6.8 cents per pound per year.

The effect of weight on track and equipment maintenance is more difficult to determine. Obviously with light cars, the special trackwork, rails and joints will last longer and tie spacing can be increased, and, with any given truck and motors, the lighter the body the longer the life of wheels, axles, truck members, brake shoes and motor insulation. The longer and wider the body, the more it costs to repaint it and to make the ordinary running repairs.

OPERATING COSTS ANALYZED

We know fairly accurately the average operating costs of the standard safety cars. Twelve companies operating over 400 safety cars averaged in 1920 1.6 cents per car-mile on their safety-car lines for maintenance of way and structure, and for equipment maintenance, 1.7 cents. Of the first figure, probably at least one-fourth, or 0.4 cent, covers items that would be directly affected by car weights; of the latter, fully one-half, or 0.85 cent, would be affected by the weight and size of body. The total of these items, or 1.25 cents, is the weight factor per car-mile of the standard safety cars on these twelve properties. The weight of these cars with average load is about 17,000 lb., so that with an annual mileage of 42,500, as previously assumed, the cost per pound is $(1.25 \times 42{,}500) \div 17{,}000 = 3.1$ cents. This cost, of course, will vary, depending on many factors, but probably on few roads would it be less than 2 cents, while on many it would be 4 cents.

The total cost, therefore, for power and maintenance is at least 7 cents per pound per year, and may be 10 cents. A fair average would be about 8.5 cents; so the 2,600 lb. of additional weight will add about $200 a year to the operating costs. Fixed charges on the $600 extra first cost of the car will add another $100 annually, making the total penalty $300 on an average.

If a materially faster schedule could be made as a result of these changes, this extra cost might be justified, but the man who expects such a result is very apt to be disappointed. The following records have been published during the past four months by the American Electric Railway Association, comparing speed of passenger interchange on safety cars and on two-man prepayment types:

	Seconds per Passenger Interchange	
	Two-man Cars	Safety Cars
Denver, Col.	2.75	....
Baltimore, Md.	2.31	2.64
San Antonio, Tex.	2.93	3.14
Charleston, S. C.	2.60	3.40
Portland, Ore.	2.97	3.61
Trenton, N. J.	1.70	1.84
Average	2.54	2.93

The records above were all taken by the operating companies, excepting those in Trenton, which were made by inspectors of the New Jersey Public Utilities Commission. They show an average difference per passenger of but 0.4 second in favor of the double-door, two-man cars, or a total of 0.8 second per passenger per trip. In other words, in handling seventy-five passengers per hour, the total duration of stops would be only one minute longer than on a two-door, two-man car. But certainly a part of this extra time is due to one-man operation rather than to interference between entering and leaving passengers. As a matter of fact, the Public Utilities Commission report on safety-car operation in Trenton indicates that only about 5 per cent of the total time of passenger stops was occasioned by passengers leaving when others were waiting to board the car. Every one familiar with traffic conditions knows that at most stops passengers board or passengers alight, but there is no interchange, or simultaneous boarding and alighting. So it is safe to say that of the one minute per hour excess time of the safety car, not more than 15 or 20 seconds could possibly be saved by a double door of wider aisle. And, further, the extra weight of these features slows down the free-running speed of the car and decreases the rate of acceleration to such an extent that the resulting schedule speed is much more apt to be reduced than increased. With the present size motors, a 15,000-lb. car with a fifty-passenger load can be safely accelerated at only about 1.5 m.p.h.p.s., the minimum rate for normal schedules. Cars weighing 17,200 to 17,500 lb., as do the Madison and Lancaster cars, or 19,000 lb. as do those in Logansport, must either accelerate more slowly than is desirable or must overload the motors, with consequent increase in maintenance cost and failures, and if still heavier passenger loads are permitted, as often occurs, this condition is still further aggravated. In other words, for general service and normal schedules in the larger cities, the standard safety car weight is about as great as the present 25-hp. motors are capable of handling; any further increase in body weights will, in many cases, call for larger motors with a material increase in first cost, and in total weight of car.

Therefore, in so far as expediting the handling of traffic is concerned, there would be no advantage in changing the present body dimensions or seating arrangement. There may be in some localities a prejudice against one-man operation, or against single-truck cars, that leads to criticisms of the loading arrangement and aisle width of the standard safety car, and which can be placated by the suggested changes. But it must be remembered that in the past five years there have been built and put into service some 4,000 one-man cars of the Birney design, and fewer than 100 that have had the changes previously discussed, and in only one case has a company previously using the standard car found it necessary to make the changes in subsequent purchases.

Economical Painting for Safety Cars

A Three-Coat System of Painting Has Been Worked Out for the Safety Cars in Trenton, N. J., Which Apparently Has a Satisfactory Life and at the Same Time a Low First Cost

BY H. E. KROUSE
Master Mechanic Trenton & Mercer County Traction Corporation, Trenton, N. J.

AFTER several experiments the officials of the Trenton & Mercer County Traction Corporation feel that they have solved their problems for refinishing twenty one-man safety cars which that company has in service. The system adopted reduces to a minimum the shopping time, as well as the necessary labor and material, and based on the results of an inspection of cars which have now been in service for the past six months it appears that a satisfactory life will be obtained at a very low first cost.

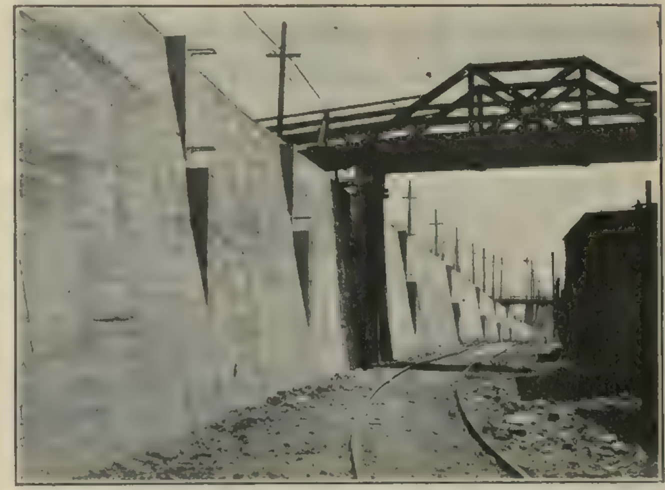
The painting system that is now being used consists of first scrubbing the car body with soft soap and water and then sanding it down. No extensive priming coat is used, but the spots of the car at points where the paint is entirely gone is covered with a metal primer. A coat of lead, tinted to correspond closely to the general car colors, is next applied. This actually constitutes the first coat and is the preparation coat for receiving the finishing enamel. Next a coat of long oil finishing enamel is applied and the numbering, striping and lettering are then completed. Striping has been almost entirely eliminated. The final coat consists of finishing varnish, which is applied over the enamel.

The application of this last coat of varnish over the oil enamel having a semi-gloss is somewhat of a departure from the established practice of this road, and is not considered a necessity. However, it has been found through a test covering ten months of service that by adding a coat of high-grade finishing varnish over the enamel where this short system of painting is used the general condition of the car is improved and a much longer service is obtained. By the use of this three-coat system the shopping time of cars has been reduced from one-third to one-half of that originally found necessary, and a substantial saving in both material and labor has been effected. Results thus far have been so satisfactory with this system that plans are being made to refinish forty more cars of the one-man type and ten 44-ft. steel cars of another type with this method in connection with the painting schedule for the coming year. Railways are practicing economies in all directions during these times of high prices and painting offers a fruitful field for economical methods.

Trolley Pole Support Built Into Retaining Wall

TO PROVIDE permanent and substantial supports for trolley poles along the Army Street retaining wall in San Francisco the city built into the wall at the time of its construction concrete steps and steel bar loops as shown in the accompanying illustration. The poles carry telephone wires, feeders and the trolley wire for tracks of the United Railroads in the street behind the retaining wall.

The steps built to support the poles are 2 ft. wide and 1 ft. 4 in. in length. The bars are 1¼ in. in diameter, the first one located 1 ft. above the step and the second 6½ ft. above it, or 6 in. below the top of the riser or shoulder of concrete that extends vertically above the step. The 1¼-in. bars extend almost through the retaining wall and hook into a grillage of reinforcing bars in a vertical plane. The loops are 13 in. square inside. When the pole has been placed it is wedged firmly against the concrete by shims driven in around the loops.



STEPS AND LOOPS FOR SUPPORTING TROLLEY POLES

"Through Bolt" Housings

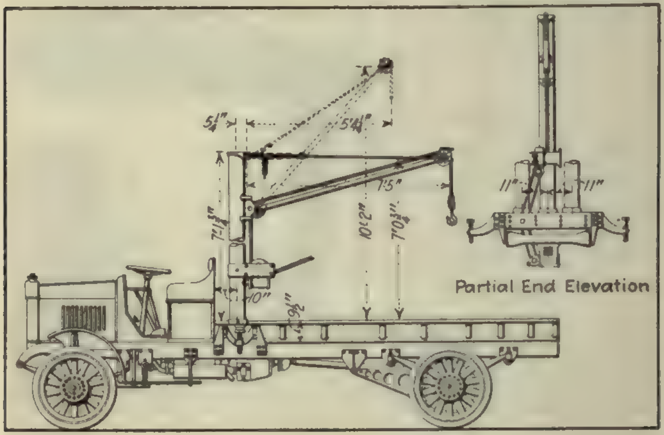
LOOSE housings have been the source of many of the troubles experienced with split frame railway motors. Early motors were built with housings held in the frame by tap bolts which screwed into tapped holes in the housing. Considerable trouble was experienced with these housings due primarily to the stretching of bolts holding the frame together. This caused the clamping action on the housings to be released and resulted in loose housings. The loose housings caused the tap bolts to work loose in the tapped holes. This condition was difficult to remedy and the repair could be only temporary.

Recently, the split frame motors of the Westinghouse Electric & Manufacturing Company have been so designed that the housing is fastened to the frame by through bolts, which are held tight by steel nuts. When the nuts wear loose, the remedy is simple and inexpensive: throw the nut away and use a new one. The old housing is known as the "tap bolt" type, while the new design is termed a "through bolt" housing. Through bolt housings have been supplied not only on the more recent designs of split-frame railway motors but also to replace the tap bolt housings on many of the older motors.

When the housing seat is badly worn, it has been found that the most satisfactory way to repair is to rebore the frame to a larger size and supply a housing to suit. The Westinghouse company has also developed an "oversize" housing in order to care for this method of repair.

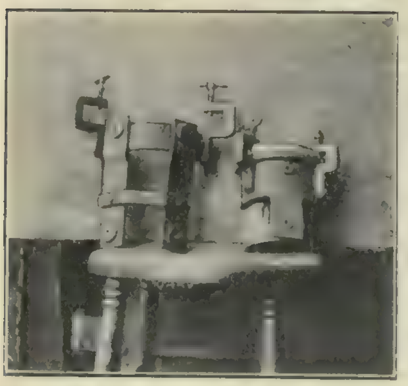
Truck Crane to Reduce Loading Time

THE Meade-Morrison Manufacturing Company, East Boston, Mass., is marketing a truck crane of 1-ton capacity which may be applied readily to any standard truck. The equipment consists of an upright steel column, a boom with fastenings, a base with cross channels, outrigger leveling screws and a winch with brackets. When the chain has been unshackled, the boom end may be slipped out of the slot and the boom laid on the truck body to prevent slapping when the truck is in motion. If it is desired to use the truck on work not requiring a winch the mast or column may be unpinned and lifted out of the base castings and the entire base may be covered by temporary flooring. With the column and winch in the usual position, loads may be pulled up over the rear of the truck by direct pull from the winch, without the use of the boom.



REMOVABLE TRUCK CRANE

Jig Facilitates Drilling of Bearings

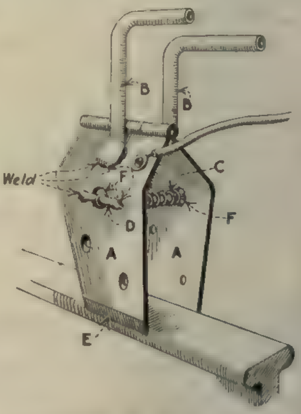


BEARING JIGS FOR LOCATING DOWEL PIN HOLES

THE accompanying picture shows a jig used in the shops of the Des Moines (Iowa) City Railway for locating the dowel pin holes in axle bearings. The bearing to be drilled is merely tightened up in the jig with the two screws shown and a drill run down through the holes provided in the jig. This scheme assures the accurate location of the dowel pin holes and the jig may be placed in position and removed very quickly. It is necessary to have a different jig for each class of bearings, and care must be taken to see that the jigs are made to fit perfect bearings to start with, otherwise inaccuracies result.

Handy Ground Clamp for Electric Welding

THE accompanying illustration shows a form of ground clamp used by the Easton Transit Company for attaching ground wires to electric welders, grinders and other apparatus used on the lines. It has been found of great convenience and its simple construction makes it available for use by any railway.



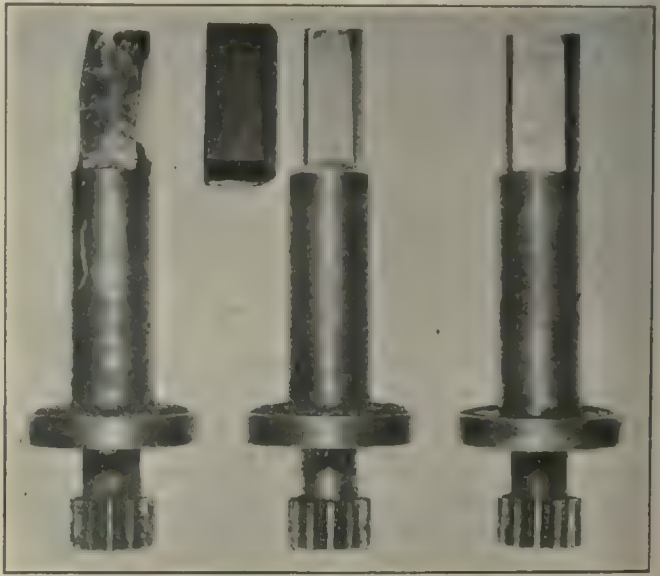
GROUND CLAMP MADE FROM HINGE

The clamp is made from an ordinary strap hinge bent as shown. Two ¾-in. holes are drilled at *F*, and a K-10 controller spring is passed through these and is held in place by two ⅜-in. rods welded in place. The ends of the hinge are cut off and sharpened at *E* and suitable handles made of ⅜-in. iron pipe are shaped and welded to the upper portion of the hinge. If it is desired to insulate these handles a piece of rubber hose may be slipped over them. The wire which forms the electrical connection is attached to the hinge by a ¼-in. stove bolt and washer.

This form of clamp can be quickly applied to and removed from almost any part of the track or special work, and it has been found especially valuable in paved streets, as its construction permits of its use in a very small crevice along the rail. When not in use the clamp is used to hold the coils of line or ground wire to some part of the machine and it thus helps to stow away the wire in good condition.

Steel Sleeves for Broached Shafts

THE use of drawn steel sleeves in repairing the handle fits of controller shafts and brake valve stems enables this work to be done at a very small percentage of the cost that new parts would cost. D. B. Flower, distributer of electric railway accessories, Philadelphia, is furnishing steel sleeves in any size necessary to fit the various broaches of controller handles and brake valve handles. The method of repairing



REPAIRING WORN BROACH FITS WITH STEEL TUBING the worn fits is shown in the accompanying illustration. The illustration at the left shows a worn stem before repairs have been started. This is machined, as shown in the center illustration, to such a size that the steel tubing will form a tight fit when forced on to the stem. The illustration at the right shows the completed job.

Letter to the Editors

Labor Bureau Statistics Are Weighted

CITY OF PHILADELPHIA
DEPARTMENT OF CITY TRANSIT, VALUATION DIVISION
PHILADELPHIA, PA., April 5, 1921.

To the Editors:

I note on page 629 of your issue of April 2, a statement that the index price of the U. S. Bureau of Labor statistics is an unweighted average.

You will find by referring to the U. S. Monthly Labor Review or to Bulletin No. 226 or No. 269 of the Labor Department that this index price is weighted in accordance with the census statistics for each important commodity. The bureau states very clearly that the index number assigns "to each commodity an influence proportioned to its importance in the country's markets."

The best statisticians regard the Bureau of Labor index prices as the best weighted and most generally satisfactory of any available in this country, and in view of the widespread public interest today in index prices and index wages, the writer ventures to suggest that you publish this correction in an early issue.

E. E. GEORGE.

[EDITORS' NOTE.—Mr. George's letter was submitted to J. F. Layng, the author of the article referred to, who has explained that Mr. George is correct as to the weighted character of the data given in the reports of the Bureau of Labor Statistics. The reference made by Mr. Layng to non-weighting was due to the statement, included in earlier bulletins, to the effect that products were so selected as to be "self-weighting." Later reports have been based on weighted data.]

Association News

Building and Structures Committee Meets at Columbus

THE Engineering Association buildings and structures committee met at the Deschler Hotel, Columbus, Ohio, on April 2, 1921. Those present were D. E. Crouse, Rochester & Syracuse Railroad, chairman; N. E. Drexler, Newport News & Hampton Railway, Gas & Electric Company; J. R. McKay, Indiana Service Corporation, and S. J. Steiner, Aurora, Elgin & Chicago Railroad.

The subcommittee on the design of a typical shop building reported the results of its two meetings with the equipment committee's subcommittee on this subject, and the various details of shop equipment layout and building were thoroughly discussed. The chairman of this subcommittee will have a tentative shop layout and plan ready to present at the next equipment committee meeting, scheduled to be held early in May.

The subcommittee which is co-operating with the way committee on the subject of wood preservation discussed this subject as it relates to the treatment of structural timber and piling and also presented data and photographs of treated timber, indicating the value of preservative treatment. A joint questionnaire on this subject has been issued and the subcommittee will make a further report after studying and summarizing the replies.

In connection with the subject of prepayment and postpayment fare collection at terminals, many plans for both were studied. Plans were laid for an early subcommittee meeting to be held with the Transportation & Traffic Association, so that a form of letter may be drafted to obtain from member companies information regarding this form of fare collection.

More than 125 members are now on the roll of the Camden company section of the Public Service Railway, an increase of more than 100 since the organization meeting.

Milwaukee Locomotive in Fine Art

OIL PAINTING BY SCHENECTADY ARTIST RECENTLY FEATURED IN ART EXHIBITION IN NEW YORK CITY

AN OIL painting of a winter scene on the Cascade division of the Chicago, Milwaukee & St. Paul Railroad, featuring one of the new General Electric passenger locomotives, was shown at a recent exhibition of the National Art Club in New York Ctiy. The painting is by Walter L. Greene of Schenectady, N. Y., the artist who painted the picture of the United States battleship *New Mexico*, recently presented to the Navy Department by E. W. Rice, Jr., president of the General Electric Company.

Mr. Greene is an American by birth, but secured his advanced art training in France and has exhibited at French and Belgian salons, as well as in this country. He is a member of the Boston Art Club.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Blanket Franchise Urged

Railway at Richmond Regards This as Necessary to Carry Out New Financing

The Virginia Railway & Power Company announces the following result of the recent valuation of its Richmond lines made by Stone & Webster as a basis for discussion of a proposed new franchise:

Money put into Richmond Railway system, including interest, less actual return	$20,249,400
Value of property, based on inventory, at average prices of 1914-1920	12,488,841
Difference	$ 7,760,559

The company is asking a return only on the inventory value in the proposed new franchise now pending before the committee on streets of the City Council.

The above relates to railway property entirely and does not include property in Richmond operated under the company's light and power franchise.

E. Randolph Williams, vice-president and general counsel, recently made public the total value of the property of the company as computed by Stone & Webster as of June, 1920. In an address before the Richmond Chapter of the American Association of Engineers Mr. Williams asserted that the entire Virginia holdings of the company were valued at $49,000,000.

Thomas S. Wheelwright, president, has declined to give out for publication the text of the Stone & Webster report, though an abstract of that part relating to the railway lines in Richmond is being used before the committee on streets in connection with the discussions of a new franchise, and that part relating to the lines in Norfolk is similarly being used before the city manager and commission of that city in relation to discussion also pending there for a new franchise.

The company operates now under a number of franchises. Of the two base franchises in Richmond that granted to the Richmond Traction Company expires in 1926 and that granted to the old Richmond Railway & Electric Company expires in 1929. With one of its important base franchises now having less than five years to run, the company is finding it difficult to raise money for needed improvements and extensions and is pressing consideration of a new blanket franchise for Richmond.

Officials of the company have informed Mayor Ainslie that while the road is making some money at the present 6-cent fare, the lack of any credit makes it necessary to pay for all improvements out of earnings, and for that reason track replacement where streets are to be paved can only proceed as the company can afford to pay for the work from its daily earnings.

Wage Cut Results in One-Day Strike

Employees of the Orange County Traction Company, Newburgh, N. Y., have accepted a reduction in wages, but not until the road had been tied up for a day by a strike. The company had a contract with its men expiring on May 1 at the following rates of pay: one-man operators, 53 cents an hour and two-man work, 48 cents an hour. In conferences with the men officers of the company advised that it was necessary for the next year that wages be lowered 10 per cent, and that the rates for one-man operators would be 48 cents an hour and two-man 43 cents an hour. The men were told that these rates would be effective from April 10. The men insisted on retaining the old rate of pay for the succeeding year, and refused to operate the cars on April 10 at the new rate. In consequence the company operated no cars on that day. Through the intervention of Major McKay, City Manager, several conferences were held between officials of the company and its employees and settlement was made at the following rate: 43 cents an hour for two-man work and 50 cents an hour for one-man work. A straight decrease of 10 per cent was made on all other departments. Service was suspended only one day.

Present Columbus Wages Continued

No reduction will be made in the wages of employees of the Columbus Railway, Power & Light Company, Columbus, Ohio, although the agreement expired on March 31 that was reached through the board of arbitration after the strike of 1919.

The announcement that no cut in wages is contemplated was made by Norman McD. Crawford, vice-president of the company. The statement issued by Mr. Crawford shows that the payroll for the year 1920 exceeded $4,500,000. The statement declares:

> Facing as we are a nation-wide business depression and the knowledge that, without exception, all business interests are either reducing wages or reducing forces, or both, it must be evident to you that this company cannot continue to be the exception unless we are able to face the prevailing condition with each individual achieving maximum efficiency, not only in production but also in loyalty united with watchfulness in the interest of the company, and undivided determination to achieve 100 per cent efficiency.

Utility Bill Protested

Ohio Companies Contend Governor's Proposal Would Make Figureheads of Commissioners

Public utilities corporations of Ohio are up in arms over the administrative reorganization bill, sponsored and submitted by Governor Davis and now pending in the General Assembly. They object to the reorganization scheme as it applies to the State Public Utilities Commission and its proposed future status. The House passed the bill and messaged it to the Senate.

PROGRAM PROTECTED

Spokesmen for the steam and electric railways and the power and light companies appeared before the Senate reorganization committee during the week ended April 2, and made emphatic protest against the provision transferring the executive work of the State Public Utilities Commission from it to the director of the proposed department of commerce. They told the committee that this change will make the utilities commissioners mere figureheads and will center too much power in the hands of the Governor, who is to name the director of this and other proposed departments.

A strong plea was made that the bill be amended to allow the commission to retain the power and authority to name all its experts and other officials. As the bill was prepared by the Governor's experts all control over the executive department of the commission is taken away and the commissioners are merely retained to exercise quasi-judicial powers, and to pass on rate cases.

As the result of the protests lodged with the committee by the representatives of the utilities the committee has incorporated amendments which make concessions, but do not accede to the wish of the corporations that the utilities commission be left in its present status and with its present powers.

AMENDMENT TO BILL URGED

The amendments, instead of taking away all the administrative powers of the commission and its right to name its subordinates, provide that the director of commerce shall serve as secretary to the commission. It is hoped that this change will meet with the approval of the public utilities companies.

It was expected that the reorganzation bill would come up for passage during the week ended April 9, after which, in the event the Senate passes the measure it must be sent back to the House for concurrence by that body.

New Orleans Conference

City Insisted on $35,000,000 Valuation for Railway—Bankers Dismayed at Prospects

A very important executive conference attended by J. D. O'Keefe, receiver of the New Orleans Railway & Light Company, Judge Rufus E. Foster of the United States District Court, and visit- ng Eastern Bankers was held at New Orleans on April 6 in order to map out a definite plan for the solution of the raction troubles of New Orleans.

The Mayor appears to be inflexible in his determination to adhere to the plan of the City Council setting forth four- een points which it regards as essen- ial for acceptance by the company if he matter is to be settled. One of hese fixes the valuation of the property at not more than $35,000,000, with a yearly return of $2,150,000, and al-- owing a further increase in the valua- ion of $5,000,000 for new money. On his new money a return of 7½ per cent would be allowed, whereas the return n the valuation the city is willing to llow would be 6.14 per cent.

Other conditions covered are that the Commission Council shall approve all ndivided profits and securities issued, nd that salaries shall be limited, track tandardized, etc.

Mr. Dahl, one of the visiting finan- iers, had consented to accept the roperty valuation of $44,700,000 placed pon it by the citizens' advisory committee and a rate of return of 7 per ent. He announced on behalf of him- elf and the visiting bankers, when the roposed plan was submitted by the cting Mayor, that further negotiations were useless. The conference there- pon came to an abrupt end. This val- ation of $44,700,000 had been approved y Receiver O'Keefe and Judge Foster.

Harold W. Newman, president of the New Orleans Stock Exchange, a mem- er of the committee, in speaking of the ecision reached by the City Commis- ioners, declared that the "fourteen" oints are so inconceivable as to de- troy the banking credit of the com- any.

If the Council passes the 7½-cent cket ordinance, Receiver O'Keefe said e would refuse to accept that fare and arned the public that if the rate of are was made to revert to 5 cents the treet cars would not be taken out.

Service-at-Cost Legislation Approved

Upon recommendation of its legisla- ve committee the Milwaukee City ouncil at its meeting on April 4 ap- roved a bill to be introduced in the tate Legislature authorizing the city o enter into a service-at-cost agree- ent with the Milwaukee Electric ailway & Light Company. The legis- tion has been asked by the public- tilities acquisition committee, ap- ointed to investigate the feasibility nd desirability of municipal ownership the electric railway and electric light nd power facilities of Milwaukee.

The bill is intended to give the city of Milwaukee power to carry out the recommendations which the public utilities acquisition committee is expected to make in a report to be submitted in the very near future. The bill provides for the usual service-at-cost agreement plus a feature which will make it possible for the city gradually to become the owner of the utility property. The company, under the proposed service-at-cost agreement, would be removed from the jurisdiction of the State Railroad Commission except in certain minor matters. Under the plan the city will also extend its credit to the company to finance extensions and improvements at a lower rate of interest than the company now has to pay.

Operating Proposal Transmitted to Council

Mayor Moore of Philadelphia, Pa., has transmitted to City Council the proposed form of agreement providing for the leasing of the city-owned Frankford Elevated Railway and Bustleton lines to the Philadelphia Rapid Transit Company for operation. Accompanying the draft of the proposed agreement was a message from the Mayor to Council, giving an outline of its provisions. It was referred without debate to the committee on transportation. Among the more important terms of the lease are these:

The Rapid Transit Company is to operate the lines and pay the city annually a return of 5 per cent on the amount invested in the property, which now amounts to about $15,000,000.

The lease is to expire July 1, 1957. There is, however, also a provision that the lease "shall absolutely cease and determine without further notice six months after the date of the final adjudication of the valuation of the properties operated by the company, including the lines leased hereunder now pending before the Public Service Commission."

The city also reserves the right at any time after five years from the date of the agreement, during the term of the agreement, to terminate it after giving the company six months' notice.

The company is to supply two of the three power stations and to equip and operate the Bustleton surface line.

The company is required to furnish "safe and reasonably adequate accommodations to the public."

The city is to supply a maximum of 100 cars (50 of these have already been ordered). It shall also supply a substation of about 4,000 kw. capacity, located at Front Street and Fairmount Avenue.

The company is to be liable for any damage claims, excepting such as result from any defect in the property that may exist prior to May 1.

The payment of rentals to the city is to have precedence over the payment of dividends on Philadephia Rapid Transit stock.

Buffalo Cuts Wages

All Unskilled Labor Included in Retrenchment — One-Man Car Operators Only Trainmen Included

Reductions in basic wages affecting all classes of unskilled employees except platform men are announced by the International Railway, Buffalo, N. Y., effective on May 1. The pay of unskilled laborers, boosted during the war by the War Labor Board to an abnormal sum as compared with wages of skilled employees, will be equalized by the new scale announced by President Herbert G. Tulley.

In a statement to employees explaining the new scale, President Tulley says that for the year 1920 the company fell short by more than $1,000,000 of earning a fair return upon the value of its property devoted to public service, according to the formula adopted by the Public Service Commission when the 7-cent fare, with four tickets for a quarter was granted.

The situation as far as 1921 is concerned is even worse, Mr. Tulley says, with the result that for the months of January and February the company failed by $300,000 to earn the amount required. This is occasioned by the industrial depression, which has been so acute that at the present time the gross receipts show a falling off of 17 per cent. Mr. Tulley said:

> At this time the management does not intend to change the basic rate of its motormen and conductors, or of its skilled employees. The abnormal rates of wage paid some classes of unskilled employees must be adjusted and certain costly working conditions must be corrected. The maximum rate of trainmen has been increased 75 per cent since May 31, 1918, while wages of certain classes of unskilled employees, such as curve cleaners, watchmen, bridgemen, helpers, car cleaners, etc., have been increased an average of 100 per cent and in some cases as high as 200 per cent.

$100,000 PAID FOR UNPRODUCTIVE TIME

President Tulley points out that last year the International paid to trainmen more than $100,000 for time during which no work was performed, exclusive of layover time. He says that "payments for which no service is rendered cannot be justified and cannot be continued, consequently a new set of working conditions eliminating such payments will become effective on May 1, 1921. Compensation for loss of time when taking the nine hours' rest period will be discontinued under the new rules and only such guarantees, allowances or special compensations as are provided in the new working conditions will be paid after May 1."

The local lines of the International in the city of Lockport last year did not earn operating expenses. Under these circumstances President Tulley explains that the company is not justified in continuing payment of the 5 cents extra compensation for the operation of one-man cars in that city. Effective May 1, trainmen in Lockport will be paid the same scale as those in Buffalo, 55, 58 and 60 cents an hour.

"The rates of pay of all other employees except those listed will for the present be continued unchanged," the statement says.

The International Railway says it makes no guarantee of the continuance of these rates for unskilled workers and that its ability to maintain them is dependent upon an improvement in the revenue of the company and the extent to which the employees co-operate with the management in its efforts to operate the property efficiently and economically.

The changes in rates per hour effective May 1 are as follows:

Auto washers, 40 cents an hour.
Bridge agents, 45 cents an hour.
Car cleaners, 40 cents an hour.
Car cleaners foreman, 45 cents an hour.
Curve cleaners, 40 cents an hour.
Drillhands, 50 cents an hour.
Firemen shops and carhouses, 40 cents an hour.
Freight truckers, 45 cents an hour.
Helpers, mechanical department (all classes), 45 cents an hour.
Janitors, 40 cents an hour.
Laborers, 40 cents an hour.
Sandmen, 40 cents an hour.
Scrubbers (paint shop), 50 cents an hour.
Scrubbers (foreman), 54½ cents an hour.
Shifters, 45 cents an hour.
Stoveman, 40 cents an hour.
Storeroom laborers, 40 cents an hour.
Sweepers, 40 cents an hour.
Watchmen, 40 cents an hour.
Trainmen employed on trolley express, flat and work cars will be paid the same rate as trainmen in the passenger service, viz: 55, 58 and 60 cents an hour.
Trainmen operating "one-man" cars in Lockport, 55, 58 and 60 cents an hour.

City of Chicago Still Obdurate

Checks for a total of $3,590,616 were refused by the city of Chicago on April 9. Tender of this amount was made by the Chicago Surface Lines in payment of the city's share of transportation revenue for the two years preceding Jan. 31, 1921. This is what is known as the city's 55 per cent of net revenue. The city contends that the ordinances under which these payments are made have been abrogated by the companies in allowing rates of fare to be increased. Last year the "55 per cent" amounted to $1,448,848, while this year it totaled $2,138,383. There was also an amount due from the companies in the matter of the adjustment of certain claims.

Mayor Thompson evidently has been forced by public sentiment to accept certain amendments to the transportation measures which are awaiting action by the State Legislature. Radical changes were made in the proposed bill at the last minute, and it will be called up for action in the near future. Originally the Mayor saw insurmountable obstacles in a suggestion that the elevated roads be included in the plan for a "transportation district." It is now intended to make it possible for the city to acquire these properties as part of the general plan.

A more important change is in a provision that the trustees under the act may raise fares above 5 cents in order to cover costs of operation. Other proposed amendments would put all employees of the district except the highest executives under civil service and would call for a referendum on bond issues.

New Wage Draft Presented

Important Changes, Including Wage Reduction, Are Outlined by Eastern Massachusetts Street Railway

The joint conference board of the union of employees of the Eastern Massachusetts Street Railway has been handed a draft of a proposed agreement prepared by the public trustees of the company and has been asked to submit the agreement to the local unions throughout the Bay State System for approval. The company announced on Feb. 25, that it would reduce wages 20 per cent effective May 2, 1921.

The new agreement is to be made for one year beginning May 2, 1921. In it the trustees state that the company will do nothing to prevent any employee from becoming or continuing to be a member of the union and will not in any way discriminate against a member thereof because of such membership.

A new provision of the proposed agreement submitted by the trustees is that all regular employees shall be provided without expense or medical examination, with group life insurance similar to that now enjoyed by the supervisory force. The amounts of this group insurance range from $500 for employees in the service one year to $2,000 for employees in the service for ten years or more. These policies are to be issued to the employees without cost to them.

OLD WAGE SCALE TO BE RESTORED

Wages will be restored to the scale in effect prior to May 1, 1920, namely 46, 48 and 51 cents an hour. Operators of one-man cars will receive 56 cents an hour. Instructors will continue to receive 4 cents an hour in addition to their regular pay. The working day of conductors and motormen and so-called miscellaneous employees will be nine hours. The company will no longer dismiss an employee solely upon complaint of the union that he has violated union rules.

Extra men called for work will continue to receive a guarantee of six hours' wages. The Saturday half-holiday with pay for shop employees is abolished. Time and a half for Sunday and holiday work and overtime to mechanical and miscellaneous employees will be discontinued. Free transportation to employees, whether or not they are in uniform, will be continued.

Seniority rating of regular conductors and motormen will remain unchanged, but work for men on the spare list will be assigned instead of being selected by seniority. Seniority rating of mechanical and miscellaneous employees will be eliminated.

Local discipline cases will be taken up by the manager and labor representatives as in the past and appeal can be made to the public trustees, who will meet one day each month for the purpose of hearing such cases as may be referred to them.

The trustees claim that changes in working conditions and wages provided for in the new agreement are proposed solely to increase efficiency and to help reduce fares.

Arbitration Unavailing in Davenport

State arbitration, tried in Iowa for the first time, has failed to settle the dispute between the trainmen's union and the Tri-City Railway over the discharge of the president of the union for criticising company descipline in a public address.

Following a hearing at Davenport the board, appointed by Governor N. E. Kendall, found "the defendant company was in error, in denying the arbitration of this controversy, under the terms of its contract."

The board, however, did not recommend the reinstatement of the discharged union official, stating this was not within its province. This leaves the controversy just where it was before resort was made to State arbitration.

While the trainmen's union voted to back up its discharged official with a strike, none has been called and the men appear to have let the matter drop.

In the meantime the trainmen are drawing a 70-cent maximum wage held in force by an injunction secured by the Socialist City Attorney of Davenport. There has so far been no disposition on the part of the company to go into court and fight this injunction, probably because the wage scale expires with the old contract on June 1. The Socialist party took sides with the trainmen, when the company notified the latter their wages would be cut from 70 to 40 cents an hour on April 1 and secured an injunction to prevent this cut. Since then an injunction has been employed to prevent the shortening of the bridge line loop, a measure of economy resorted to by the railway.

Future Policy of Detroit United Not Announced

No announcement has been made by the Detroit (Mich.) United Railway as to what action it will take next with respect to the future, in view of the recent defeat of its service-at-cost plan. An early meeting of the directors of the company is scheduled and some action will probably be announced soon after this meeting. Announcement was made by the company prior to the election, however, that no matter what was the outcome of the referendum it would continue to give such service as it was enabled to.

The final count of the ballots cast on April 4 on the two ordinances pertaining to railway matters in Detroit, showed results about as indicated by the preliminary reports based upon counts from a few precincts. The Detroit United Railway's proposed service-at-cost ordinance was voted down, while the city's purchase-plan ordinance was carried with about the same percentage of votes as were cast last year in favor of the bond issue to provide for a municipal system of street railways for the city.

The company's proposition required a 60 per cent affirmative vote, but received only about 36½ per cent. The city's ordinance providing for the purchase of several sections of Detroit United Railway lines received about 65 per cent majority.

Reports from the sections of the city now being served by the new Detroit Municipal Railway lines, which have been in operation since Feb. 1, indicate that municipal ownership was highly indorsed. In some instances in the St. Jean and Charlevoix district, a vote of approximately four to one was reported in favor of the purchase plan ordinance.

Wage Conference Proposed in Salt Lake City

New contracts between the Utah Light & Traction Company, Salt Lake City, Utah, and the Amalgamated Association are being sought by company officials. The present contract, which has to do with hours of work, wages and working conditions, will expire on May 1.

A proposal to reduce the present pay of platform men and carhouse mechanics is anticipated by the union officials, but nothing of this nature was mentioned at the preliminary conference between General Manager Dicke of the company and President Baker of the union. It was said recently, however, that if a wage reduction were sought it might, in some instances, be as much as 20 per cent. Company officials would not discuss the matter other than to say that a request for a conference had been made by it.

The time for holding the conference was designated as April 11.

City Seeks Crossing Rights

Legislation effecting the crossing of privately owned lines by municipally owned railways in Detroit has been introduced in the State Legislature. One bill, the Pitkin bill, is reported as an amendment of the general railroad law which makes no provision for crossings by municipally owned lines. The Pitkin bill provides for the handling of such crossings by the State Public Utilities Commission.

The Copley bill, introduced about a week prior to the Pitkin bill, would give the City Council power to decide questions relative to such crossings.

In discussing the Pitkin bill, David H. Crowley, special counsel for the city of Detroit in street railway matters, who drafted the Copley bill, stated that the former would endanger the success of municipal ownership in Detroit. It would transfer jurisdiction over municipal street railway crossings to an outside body such as the Public Utilities Commission, while such crossings primarily concern the city.

The Copley bill, Mr. Crowley states, gives the commission a limited authority to pass on safety devices for crossings in which a street railway is involved, while the Pitkin bill, if it delegates control of such crossings entirely to the commission, is dangerous to municipal ownership.

Carhouse Changes at Boston

On account of the destruction of two large surface carhouses by recent disastrous fires the Boston (Mass.) Elevated Railway has undertaken extensive repairs and enlargements of two other carhouses to provide the necessary facilities. On Feb. 21 the carhouse at Neponset was burned to the ground, followed by the partial destruction of the Amory Street carhouse on March 4.

To provide for the loss of the Neponset station the so-called Park Street carhouse at Fields corner is being entirely remodeled. The old wooden structures are being demolished and a new brick building is to be constructed in the center of the area with a lobby and office building at one side. The track layout is being revised to accommodate a total of 122 of the largest type cars.

The plan is to establish an up-to-date carhouse of good exterior appearance for the storage inspection and minor repairs of surface cars. The area on the public street sides is to be surrounded by a neat masonry wall, and it is expected that property in the neighborhood will be considerably improved by the removal of the unsightly wooden structures and the construction of the new carhouse and office building. The layout has been worked out on lines similar to those in use in Cleveland and other Middle West cities and will be thoroughly fireproof and modern in every respect.

To take the place of the Amory Street house the old surface car station at Forest Hills, which for some time has been out of use except as a dead storage plant, will be repaired and put into shape for about 100 of the largest cars. It will be put into service as a full operating rating station, with inspection and repair facilities, pits, etc.

Practically all this repair and reconstruction work will be done by the engineers and working forces of the company.

Although a considerable number of old cars were destroyed by the two fires the trustees are not planning any immediate additions to rolling stock except ten one-man cars, on which bids have been asked.

Trainmen Agree to Wage Cut

Motormen and conductors of the North Alabama Traction Company at Albany and Decatur voluntarily agreed to accept a cut of about 5 per cent. in their wage scale in a hearing before the Public Service Commission on April 4 of the petition of the receiver of the company for permission to operate one-man cars on all lines. The proposal was made by Melvin Hutson, attorney for the men, who opposed the receiver's petition. Witnesses for the company testified that the monthly deficit of the company now is about $800. The proposed cut of the employees would save about $250 a month.. If the company is permitted to operate one-man cars the services of eight employees will be dispensed with, which will save the company a little more than $900 a month, and will give an earning of about $100 a month, provided other expenses do not increase.

Cleveland Men Voting

Officials of the union representing the 3,400 motormen and conductors in the employ of the Cleveland (Ohio) Railway Company have offered to accept the 20 per cent reduction in pay effective on May 1 if the company's closed shop agreement with the men is allowed to remain in force. John J. Stanley, president of the railway, has consented to this providing the closed shop agreement is changed sufficiently to permit union members to resign from the union without being forced to quit the company's service. All new men must join the union within sixty days after entering the employ of the company.

The 20 per cent wage reduction will make the wages of the Cleveland men 55 cents an hour for the first three months, 58 cents an hour for the next nine months, and 60 cents an hour thereafter instead of 70-72 and 75 cents an hour.

At mass meetings of the union members on April 13 propositions made by Mr. Stanley were discussed. It was planned to conduct a referendum vote on the propositions among the members on April 15. The proposals upon which the men were to vote are:

1. To accept a 20 per cent wage reduction and the closed shop agreement to remain in effect as at present.
2. To accept a reduction in pay to make the scale 55c. an hour for the first year and 62c. and hour thereafter, the closed shop agreement remaining in effect except for an amendment that will permit members of the Union to resign without being forced to quit the company's service.
3. To arbitrate all points in dispute including the closed shop, questions to be as follows:

Shall the company continue the present closed shop in effect?

Shall compensation for the trainmen be continued as provided by the War Labor Board for night runs, spread runs and Sunday runs?

What shall the new rate of pay be?

In case the men elect to have all points in dispute arbitrated, James H. Vahey, Boston, attorney for the International Union, is to represent the men, while C. Loomis Allen, Syracuse, is to act for the company.

Mr. Stanley and officials of the union have come to a practical agreement regarding other demands of Mr. Stanley for changes in the present clauses inserted by the War Labor Board. This understanding between the union officials and Mr. Stanley calls for the elimination of all extra pay for the spread time runs, continuation of ten hours pay for eight hours night car runs and payment of time and a quarter for work in excess of regular runs instead of time and one-half.

Irregularities Alleged in Connection with Railway Legislation in Massachusetts

A formal investigation has been started by the Massachusetts Legislature of charges of irregularities in connection with the passage of legislation in 1918 and 1919 affecting the Boston (Mass.) Elevated Railway and the Eastern Massachusetts Street Railway. Although there has been constant criticisms of members of the Legislature ever since the passage of the acts establishing the public trustee method of control of these two traction properties, it was not until recently that open charges were made.

During the course of a debate on a bill to have the trustees report on the feasibility of instituting more 5-cent fare lines in Boston, Representatives Hays and Lomasney both openly charged that members of the 1918 Legislature borrowed money from certain Boston trust companies and speculated in railway stock just prior to the passage of the legislation, the inference being that they were thus influenced to vote for the bill which would presumably increase the market value of the railway securities. These charges aroused a great deal of discussion in the press and in the present Legislature with the result that an order was passed for an investigation.

A committee has been appointed consisting of Senators Lyman A. Griswold, chairman, and Walter A. Hardy, Representatives Henry L. Shattuck, James B. Brown and John W. McCormack, none of whom was a member of the 1918 Legislature. It was decided at the start to have no one on the investigating committee who was a member of the Legislature at the time the bills were passed. Subsequently it was decided to investigate the 1919 Legislature, which passed the bill authorizing the Commonwealth to purchase the Cambridge subway from the Boston Elevated Railway.

The State Bank Commissioner has been directed to furnish to the committee the names of all Senators or Representatives in 1918 who had loans in any of the trust companies in Massachusetts which have been closed as a result of financial difficulties. It is also proposed to broaden the scope of the inquiry to require the Boston Elevated Railway to furnish its transfer books and records, and to call upon Boston brokerage firms for a record of their transactions at the time of this particular legislation.

Eight-Hour Bill Defeated. — Senate bill No. 313, in the California Legislature, known as Harris eight-hour bill for electric railway man, was passed out favorably by the labor and capital committee of that body, but was defeated in the Senate on March 31. The first vote was twenty-two to sixteen. The measure was then set over for reconsideration and was defeated on April 9 by vote of twenty-one to eighteen.

News Notes

Attempt to Repeal Utilities Law Fails.—Attempts to abolish the Utility Commission of Tennessee have failed in the present Legislature which has only less than one week to run now before final adjournment.

Electrical Industry Advertised. — A page advertisement appears in *Collier's* for April 9 entitled "Will Your Town Stop or Move Ahead?" It is inserted by the *Electrical World* and points out that during the next four years the electric light and power industry, if it is to keep up with the demands, needs an additional investment of approximately $4,000,000,000. The interest which the public has in the adequate development of the electric light and power companies is pointed out. The advertisement is signed by James H. McGraw, president of the McGraw-Hill Company, Inc.

Municipality to Install Trackless Trolley.—The Board of Estimate of New York City has appropriated $383,200 for extensions, improvements, and operation of municipal trolleys. Of this sum, $83,200 was given to the Staten Island lines to extend service on the Meyers Corners line to Linoleumville and to put into operation a trackless trolley between Schmidt's lane and Seaview Hospital. Of the amount set aside $150,000 will go to purchase sixty used cars to take care of the summer traffic in Staten Island. A similar amount was appropriated for the purchase of one-man cars for the Williamsburg Bridge.

Interurban Reduces Wages.—A reduction in the wages of its trainmen of 17½ per cent and those of linemen trackmen, shopmen and power house men of from 15 to 20 per cent was made on April 1 by the Indianapolis & Cincinnati Traction Company, Indianapolis, Ind. This, it is explained, makes a reduction that amounts to approximately one-half of the increases granted since 1918. The wages of the trainmen were reduced from 47 cents to 40 cents an hour, while the wages of the linemen, shopmen, trackmen and power house men, which varied from 35 to 60 cents an hour, were reduced to from 30 cents to 50 cents an hour.

Wage Reduction Talk in Cincinnati. —The Cincinnati (Ohio) Traction Company has notified its stationary firemen it desires to reduce their wages. This is in accordance with the existing contract between the company and the Union. The firemen's contract year ends May 1, that of the engineer's June 1 and of the motormen, conductors and other employees July 1. All would run on from year to year unless modified. It has not been announced how much the company wants the wages of the firemen reduced, but there is a report that it is around 20 per cent. Stationary firemen get 90 cents an hour and regular motormen and conducotrs 59 cents an hour.

Trainmen Accept Wage Cut.—Employees of the Albany Southern Railroad, Hudson, N. Y., have agreed to accept a 10 per cent reduction in wages. General Manager Hewes in a circular letter to the employees issued on April 2 asked them, in view of the reduced earnings of the company, to accept a cut of 10 per cent in their pay. The employees asked for a conference with the general manager. The request was granted and after a discussion of the subject of the company's condition the employees agreed to accept the reduction. The reduction affects motormen, conductors, freight crews, freight handlers and some others. The motormen and conductors were receiving 55 cents an hour.

Programs of Meetings

National Electric Light Association

The National Electric Light Association will hold its forty-fourth annual convention in Chicago from May 31 to June 3, 1921. The business session and meetings of the convention will be held at Hotel Drake.

Mechanical Division of A. R. A.

The general committee of the Mechanical Division of the American Railway Association, at a meeting in New York on March 30, decided to hold a business session at the Hotel Drake, Chicago, on June 15 and 16, instead of the convention that was to have occurred at Atlantic City. The program has been modified and reports will be presented only by the committees on the following subjects: Prices for Labor and Material, Car Construction, Loading Rules, Brake Shoe and Brake Beam Equipment, Train Brake and Signal Equipment, Specifications and Tests for Materials, Tank Cars and Standing Methods of Packing Journal Boxes. Both morning and afternoon sessions will be held.

Chamber of Commerce

The ninth annual meeting of the Chamber of Commerce of the United States will be held at Atlantic City, N. J., April 26 to 29, 1921. The session will begin with a meeting of the national councillors on the afternoon of April 26. Thereafter there will be general sessions in the morning of each day and the afternoon of April 29, with group meetings on the afternoons of April 27 and 28. The groups this year are (1) civic development, (2) domestic distribution, (3) fabricated production, (4) finance, (5) foreign commerce, (6) insurance, (7) national resources production and (8) transportation and communication, including (a) shipping and (b) railroads. The two sections of the transportation group meet separately on Wednesday afternoon but jointly on Thursday afternoon.

Financial and Corporate

Toledo Deficit Increasing

Economies Sought From Wage Readjustment, Revised Power Rates and Car Rerouting

The operating deficit of the Community Traction Company, Toledo, Ohio, for March is expected to be larger than that for February, when it amounted to $58,000. The payments made on April 11 showed a balance of about $37,000 accumulated in the maintenance, depreciation and claims and damage funds to offset the deficit in the stabilizing fund, which has fallen below the $300,000 mark now. Maintenance has been set at 10 cents a car-mile in order to create a surplus for summer work. In the depreciation fund, which may be used for extensions and betterments, there is now a surplus of $14,000.

The wage conference held for the purpose of working out a contract between the Community Traction Company and the carmen's union has dragged along and will probably end in a deadlock. The men have been offered a cut in wages from 60 cents to 58 cents an hour. A vacation of two weeks with pay has also been withdrawn. Electrical workers are also debating the terms of a new agreement and in the meantime the old contract is being extended.

It is thought that action on contracts is being postponed in order to await the decisions of conferences due on May 1 between the men and the railways at Detroit and Cleveland. The Toledo contract has always been one month in advance of the contracts of these two cities, and on a down-scale revision of wages is put in an important position in the bargaining. What step the city might take to protect its equity in the property in event of a strike is problematical. The commissioner and board of control may have something to say about wages to be paid before the matter is definitely settled.

The refusal of Henry L. Doherty to allow city experts to view the books of the Acme Power Company, one of his subsidiary power companies in Toledo, in an effort to fix a reasonable rate for power supplied by the Toledo Railways & Light Company to the Community Traction Company has brought forth a friendly effort from the city officials to bargain with the company. The conferences on power will be taken up soon by Henry Riggs, Ann Arbor; V. B. Phillips, Cleveland, and David Friday, Ann Arbor, who have been secured to determine the rate for the contract. The Acme Power Company has set a rate at 2.35 cents a kilowatt, which the commissioner has disapproved as excessive.

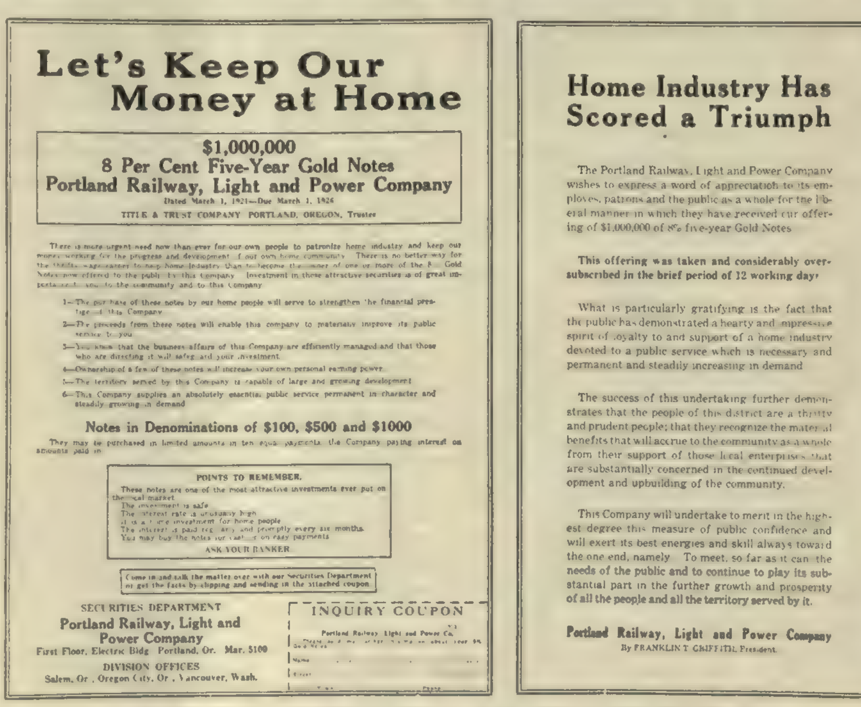
A portion of a rerouting plan suggested to the Council by Commissioner Wilfred E. Cann has passed the Council committee and will without doubt be put into effect in a few weeks. It is a plan to eliminate a portion of one by combining two lines into a one-way belt. The elimination of the Indiana Avenue line as proposed has not had the sanction of the Council as yet. The changing of the Huron and Erie lines and the making of a separate line of Western Avenue will effect a saving estimated at $97,000 a year in the operation of the system here.

Suspension of Service Suggested

Threats to abandon the City Railway line and perhaps the Wheeling & Elm Grove Line, both owned by the Wheeling (W. Va.) Public Service Corporation, were made at a meeting of the City Council by J. D. Whittemore, general manager, following orders from the city to pave between the tracks. Mr. Whittemore said:

> Notwithstanding the revision of the fares effective during December, 1920, the City Railway continues to operate at a deficit, and inasmuch as there appears to be little prospect of relief in sight the directors of the company have voted to call a meeting of its stockholders and to recommend that they take such steps as may be necessary to discontinue the operation of the road and liquidate whatever assets may remain. It is expected that the stockholders of the company will follow this recommendation and that immediate steps will be taken to wind up the affairs of the corporation.
>
> In view of these facts and conditions, I regret to state that it will not be possible for the City Railway to undertake any of the work outlined in your letters.

Buses compete with lines of the Wheeling & Elm Grove Company.



Let's Keep Our Money at Home

$1,000,000
8 Per Cent Five-Year Gold Notes
Portland Railway, Light and Power Company
Dated March 1, 1921—Due March 1, 1926
TITLE & TRUST COMPANY PORTLAND, OREGON, Trustee

There is more urgent need now than ever for our own people to patronize home industry and keep our money working for the progress and development of our own home community. There is no better way for the thrifty wage earner to help home industry than to become the owner of one or more of the 8% Gold Notes now offered to the public by this Company. Investment in these attractive securities is of great importance to you, to the community and to this Company.

1—The purchase of these notes by our home people will serve to strengthen the financial prestige of this Company.
2—The proceeds from these notes will enable this company to materially improve its public service to you.
3—You know that the business affairs of this Company are efficiently managed and that those who are directing it will safeguard your investment.
4—Ownership of a few of these notes will increase your own personal earning power.
5—The territory served by this Company is capable of large and growing development.
6—This Company supplies an absolutely essential public service permanent in character and steadily growing in demand.

Notes in Denominations of $100, $500 and $1000

They may be purchased in limited amounts in ten equal payments, the Company paying interest on amounts paid in.

POINTS TO REMEMBER.
These notes are one of the most attractive investments ever put on the local market.
The investment is safe.
The interest rate is unusually high.
It is a home investment for home people.
The interest is paid regularly and promptly every six months.
You may buy the notes for cash or on easy payments.
ASK YOUR BANKER

Come in and talk the matter over with our Securities Department or get the facts by clipping and sending in the attached coupon.

SECURITIES DEPARTMENT
Portland Railway, Light and Power Company
First Floor, Electric Bldg. Portland, Or. Mar. 5100
DIVISION OFFICES
Salem, Or., Oregon City, Or., Vancouver, Wash.

INQUIRY COUPON
Portland Railway, Light and Power Co.

Home Industry Has Scored a Triumph

The Portland Railway, Light and Power Company wishes to express a word of appreciation to its employees, patrons and the public as a whole for the liberal manner in which they have received our offering of $1,000,000 of 8% five-year Gold Notes.

This offering was taken and considerably oversubscribed in the brief period of 12 working days.

What is particularly gratifying is the fact that the public has demonstrated a hearty and impressive spirit of loyalty to and support of a home industry devoted to a public service which is necessary and permanent and steadily increasing in demand.

The success of this undertaking further demonstrates that the people of this district are a thrifty and prudent people; that they recognize the material benefits that will accrue to the community as a whole from their support of those local enterprises that are substantially concerned in the continued development and upbuilding of the community.

This Company will undertake to merit in the highest degree this measure of public confidence and will exert its best energies and skill always toward the one end, namely: To meet, so far as it can, the needs of the public and to continue to play its substantial part in the further growth and prosperity of all the people and all the territory served by it.

Portland Railway, Light and Power Company
By FRANKLIN T. GRIFFITH, President.

SPECIMENS OF THE APPEAL AND THE APPRECIATION

Direct Offering Successful

$1,000,000 of Notes Sold in Twelve Days to Employees, Customers and Public

The Portland Railway, Light & Power Company, Portland, Ore., has sold to its employees, customers and to the public an issue of $1,000,000 of 8 per cent five-year gold notes, the entire offering being disposed of in twelve days, with a considerable oversubscription. This is the first attempt the company has made to dispose of securities since the original preferred and common stock of the company was sold.

The campaign was conducted by the company itself through its employees, but met with whole-hearted co-operation from the many banking institutions located in the Portland territory. These banks disposed of nearly $100,000 of the gold notes purely as an accommodation without a cent of commission for this service.

The selling organization of the company was under the direction of A. C. McMicken, commercial manager of the company. The sales force consisted of about fifteen officials and department heads who acted as "key men." These chairmen recruited their individual committees for selling the notes to the other employees and to the company's patrons. The publicity and advertising in connection with the offering were directed by W. P. Strandborg of the company.

The success of the campaign is indicated by the fact that nearly 1,900 out of 2,800 employees of the company subscribed for the notes. The balance of the offering was taken by the public, the total number of individual subscribers being approximately 33,000.

A remarkable feature of the campaign was the fact that approximately

70 per cent of the subscriptions were paid for in actual cash, although the company offered two forms of partial payment subscriptions—one 10 per cent down and 10 per cent a month, and the other 10 per cent down and the balance before April 15. As indicating the wide-spread distribution of the company's notes the largest individual sale was $7,500.

In conjunction with the selling campaign an intensive advertising drive was conducted in which both the educational and selling features of the undertaking were emphasized. The company sent to its 54,000 customers a four-page circular containing a great deal of detailed information about the company's affairs and also about the notes themselves. With this circular went a letter signed by Franklin T. Griffith, president of the company, and an information card with details of the method of applying for the notes.

An "Inquiry Coupon" was attached to the circular and as the requests for further information came in they were tabulated and indexed and followed up by sending out an illustrated folder of eight pages with additional information about the note issue and the service which the company is rendering to the many communities in its territory. In addition to this a series of fifteen display advertisements, quarter page in size, were used in the local daily papers and selected advertisements were used in practically all the publications in the territory that is served by the company.

These display advertisements were supported by two special issues of *Watts Watt*, the official publication of the company distributed on the cars every Friday morning. Attractive car cards were also used as dash signs on all the company's passenger cars for a period of two weeks and window newspapers pointing out attractive investment features of the gold notes were displayed, two in each car.

An important feature of the campaign was the method used in securing the names of prospects. Each of the 2,800 employees of the company was pledged to turn in to the campaign organization a list of three names each day for a period of ten days. This gave the selling force a list of 84,000 persons and these were carefully sifted by removing duplications and eliminating those that were not regarded as favorable prospects, and the balance of the list was turned over to teams of two employees each and personal solicitation was made.

The entire cost of the campaign was substantially less than if the notes had been offered to the public through the regular banking and investment channels. The exact cost of the campaign is not available at this time, but as evidence of the very nominal cost it can be said that the expense for advertising, which was the major part of the cost, was under 0.7 of 1 per cent. The balance of the cost was limited virtually to printing of the forms, blanks and stationery and the necessary postage.

Quebec Company Negotiating Sale.—The Quebec Railway, Light, Heat & Power Company, Quebec, Que., is negotiating for the sale of the Quebec & Montgomery Railway. With the sale of this railway the company will become solely a public utility concern.

Railway Credit Growing Steadily

Notwithstanding Increased Operating Ratio City and Interurban Company's Credit Indicator Increases 10 per Cent

According to an analysis of operations covering 127 electric railway companies made by E. J. Murphy, statistician of the bureau of information and service of the American Electric Railway Association, the gross income for seventy-two urban companies increased 4.3 per cent, while for fifty-five interurban companies it increased 4.9 per cent over the previous year. Deductions by interurban companies increased 7.9 per cent against 0.15 by urban companies.

EVEN with these increased fixed charges the net income of city companies applicable to dividends increased 42.5 per cent, interurban companies decreased 1.6 per cent, while if combined the weighted average shows a 24.5 per cent gain.

The credit index, that is, the ratio of gross earnings to gross income, also shows improvement. In the case of the urban companies it increased from 4.74 to 5.24, the interurban companies 3.65 to 3.98 while if the totals are combined the index is 4.54 and 5.02 for 1919 and 1920 respectively, a gain of slightly more than 10 per cent.

Deductions from gross income, for fixed charges, are still greater than it should be for a sound financial basis. Improvement has been made by the urban companies. In 1920 this percentage was 87.8, as against 90.3 the previous year. For the interurban companies the opposite is true. In 1920, 70.8 per cent of gross income went to fixed charges while in 1919 the percentage was 68.8.

On a combined basis the operating revenue increased 16.3 per cent and operating expenses 18.9 per cent. The operating ratio increased from 76.8 in 1919 to 78.4 in 1920: The increase in operating expenses seems to have been consistent. For all companies it was 18.9 per cent, for the city companies 18.8 per cent and for interurbans 19.2.

An analysis of the operating accounts shows that notwithstanding this increase the amount spent for each item follows practically the same percentage for the two years, the greatest variation, however, being in the cost of power, with the cost of conducting transportation next. Both of these variations were in the neighborhood of 1 per cent.

TABLE I—COMBINED INCOME STATEMENT OF SEVENTY-TWO CITY AND FIFTY-FIVE INTERURBAN ELECTRIC RAILWAYS FOR THE CALENDAR YEARS 1919 AND 1920

	72 City Companies			55 Interurban Companies			127 City and Interurban Companies		
	1920	1919	Per Cent Increase	1920	1919	Per Cent Increase	1920	1919	Per Cent Increase
Railway operating revenue	$229,629,280	$196,999,477	16.6	$37,724,460	$32,75,494	15.2	$267,353,740	$229,751,971	16.3
Operating expenses:									
Way and structures	$22,625,964	$19,166,412	18.0	$4,818,027	$4,113.560	17.1	$27,443,991	$23,279,972	17.9
Equipment	23,742,679	20,480,766	15.9	3,431,323	3,041,514	12.8	27,174,002	23,522,280	15.5
Power	28,940,898	22,978,675	25.9	5,753,790	4,566,871	25.8	34,694,688	27,545,546	25.9
Conducting transportation	81,972,242	68,629,920	13.8	9,200,254	7,872,619	16.7	91,172,496	76,502,539	18.1
Traffic	688,120	664,679	3.5	250,454	228,596	9.6	938,574	893,275	5.1
General and miscellaneous	23,475,899	20,796,833	12.8	4,912,135	3,969,733	23.7	28,388,034	24,766,566	14
Transportation for Investment. Cr.	113,036	131,085	*13.8*	2,927	1,078	171.5	115,963	132,163	*12.2*
Railway operating expenses	$181,332,766	$152,586,200	18.8	(b) $28,365,448	(a) $23,799,021	19.2	$209,698,214	$176,385,221	18.9
Net operating revenue	48,296,514	44,413,277	8.7	9,359,012	8,953,473	4.5	57,655,526	53,366,750	8.0
Operating ratio	79.2	77.5	2.2	75.2	72.6	3.6	78.4	76.8	2.1
Net revenue: Auxiliary operations	$9,821,719	$10,145,846	*3.2*	$1,513,818	$1,634,812	*7.4*	$11,335,537	$11,780,658	*3.8*
Taxes	15,672,984	13,448,647	16.5	1,965,564	1,731,456	13.5	17,638,548	15,180,103	16.2
Operating income	42,445,249	41,110,476	3.3	8,907,266	8,856,829	0.57	51,352,515	49,967,305	2.8
Non-operating income	3,969,075	3,389,232	17.1	1,241,669	816,228	52.2	5,210,744	4,205,460	23.9
Gross income	46,414,324	44,499,708	4.3	10,148,935	9,673,057	4.9	56,563,259	54,172,765	4.4
Deductions	40,198,081	40,136,210	0.15	7,187,695	6,663,743	7.9	47,385,776	46,799,953	1.3
Net income	6,216,243	4,363,498	42.5	2,961,240	3,009,314	*1.6*	9,177,483	7,372,812	24.5
Per Cent: Gross income to fixed charges	115.5	110.9	4.1	141.2	145.2	*2.8*	119.4	115.8	3.1
Ratio: Net income to operating revenue	2.7	2.2	2.3	7.9	9.2	*14.6*	3.4	3.2	5.7
Car-miles operated	530,238,431	518,507,394	2.2	74,609,893	73,306,782	1.8	604,848,324	591,814,176	2.2

Figures in italics denote decrease. (a) Includes $7,206 undistributed expenses. (b) Includes $2,392 undistributed expenses.

TABLE III—OPERATING STATISTICS AND DERIVED RATIOS FOR THE CALENDAR YEARS 1919 AND 1920

	City				Interurban				Total City and Interurban			
	No. of Companies	1920	1919	Per Cent Increase	No. of Companies	1920	1919	Per Cent Increase	No. of Companies	1920	1919	Per Cent Increase
Operating revenue	72	$229,629,280	$196,999,475	16.6	55	$37,724,460	$32,752,494	15.2	127	$267,353,740	$229,751,971	16.4
Per mile of line	53	44,336	38,662	14.7	44	11,656	10,354	12.5	97	32,067	27,927	14.8
Passenger revenue	72	$219,950,509	$191,975,086	14.5	55	$31,729,735	$27,649,905	14.8	127	$251,680,244	$219,624,991	14.5
Per revenue passenger	68	0.069	0.063	7.9	43	0.12	0.11	9.1	111	0.072	0.066	9.1
Per car-mile	72	41.5	37.0	12.1	55	42.4	37.7	17.4	127	41.6	37.1	12.1
Per mile of revenue track	60	$25,508	$22,755	12.1	45	$8,010	$7,177	11.2	105	$20,325	$18,243	11.4
Per car-hour	68	3.72	3.81	*2.3*	46	4.64	4.09	13.4	114	3.82	3.42	11.6
Per maximum revenue car operated daily	59	$15,598	$13,729	13.6	39	$17,049	$15,410	10.5	98	$15,739	$13,894	13.2
Total passengers	71	3,903,547,828	3,755,907,509	3.9	48	274,064,071	255,575,776	7.2	119	4,177,611,899	4,011,483,285	4.1
Revenue passengers	68	2,933,559,233	2,807,339,035	4.5	42	241,660,531	226,021,569	6.9	110	3,175,219,764	3,033,360,604	4.6
Per car-mile	68	6.2	6.1	1.8	42	3.7	3.6	2.7	110	5.9	5.8	1.7
Per car-hour	66	57.4	56.4	1.7	39	46.8	45.2	3.5	105	56.4	55.3	1.9
Per mile of revenue track	58	375,540	356,788	5.3	37	74,642	69,638	5.7	95	300,169	284,316	5.6
Per maximum revenue cars operated daily	57	211,121	242,451	*12.9*	31	124,276	115,971	7.2	88	204,826	228,903	*10.5*
Transfer passengers	61	735,758,394	707,087,306	4.1	21	23,492,729	21,974,451	6.9	82	759,251,123	729,061,757	4.1
Ratio: Transfer passengers to revenue passengers	61	25.3	27.6	*8.3*	18	11.6	11.7	*.8*	79	24.4	26.3	*7.2*
Car-miles operated	72	530,238,431	518,507,394	2.3	55	74,609,893	73,306,782	1.8	127	604,848,324	591,814,176	2.2
Per car-hour	68	9.1	9.1	..	46	11.0	10.9	.9	114	9.3	9.3	....
Per mile of revenue track	60	59,723	59,147	1.0	45	18,974	18,843	.6	104	43,750	36,028	21.4
Per maximum revenue car operated	59	39,547	40,042	*1.2*	39	40,673	40,943	*.6*	98	39,656	40,130	*1.1*
Car-hours	68	45,516,538	44,425,174	2.5	46	5,495,175	5,370,832	2.3	114	51,011,713	49,796,006	2.4
Miles of line	53	4,233.4	4,137.6	2.3	44	2,545.0	2,527.8	.7	97	6,778.4	6,665.4	1.7
Miles of revenue single track	60	7,665.4	7,546.2	1.6	45	3,094.9	3,074.8	.7	105	10,760.3	10,621.0	1.3
Average maximum number of cars operated daily	59	10,591	10,258	3.2	39	1,141	1,112	2.6	98	11,732	11,370	3.1

Italics indicate decrease

The amount of service rendered by the city companies increased 2.2 per cent, while for the interurban companies it increased but 1.8 per cent. The traffic index, car-miles per revenue passenger for sixty-eight city companies, shows a slight decrease. In 1920 the ratio was 0.1615, as compared with 0.164 in 1919. For forty-two interurban companies the index was 0.2705 in 1920, as against 0.278 in 1919.

Inquiry Into Ending of Trusteeship.—Termination of the trusteeship of the Connecticut Company, New Haven, Conn., was discussed at an executive session of the committee of railroads of the General Assembly at Hartford on April 5, with the result that two of its members were delegated to ask the Attorney General for advice as to the course to be taken in turning the company over to the stockholders.

TABLE II—COMPARATIVE SUMMARIZED INCOME STATEMENT (ON A CAR MILE BASIS) OF 127 ELECTRIC RAILWAYS FOR THE CALENDAR YEARS 1919 AND 1920

	Seventy-Two City Companies			Fifty-Five Interurban Companies			127 City and Interurban Companies		
	1920	1919	Per Cent Increase	1920	1919	Per Cent Increase	1920	1919	Per Cent Increase
	Cents per Each Mile			Cents per Each Mile			Cents per Each Mile		
Railway operating revenue	43.3	38.0	13.9	50.6	44.7	13.2	44.2	38.8	13.9
Operating expenses:									
Way and structures	4.3	3.7	16.2	6.5	5.6	16.1	4.5	3.9	15.4
Equipment	4.5	3.9	15.4	4.6	4.1	12.2	4.5	4.0	12.5
Power	5.5	4.4	25.0	7.7	6.2	24.1	5.7	4.7	21.3
Conducting transportation	15.5	13.2	17.4	12.3	10.7	15.0	15.1	12.9	17.6
Traffic	0.1	0.1	....	0.3	0.3	....	0.2	0.2	....
General and Miscellaneous	4.4	4.0	10.0	6.6	5.4	22.2	4.7	4.2	11.9
Transportation for Investment Cr.	0.02	0.03	*33.3*	0.04	.001	300.0	0.02	0.02	....
Total operating expenses	34.3	29.3	17.1	38.0	32.3	17.6	34.7	29.8	16.4
Net operating revenue	9.1	8 6	5.8	12.6	12.2	3.3	9.5	9.0	5.6
Operating ratio: (per cent)	79.2	77.5	2.2	75.2	72.6	3.6	78.4	76.8	2.1
Net revenue: auxiliary operations	1.9	1.9	*6.0*	2.0	2.2	9.1	1.9	2.0	5.0
Taxes	3.0	2.6	15.4	2.6	2.2	9.1	1.9	2.0	5.0
Operating income	8.0	7.9	1.3	12.0	12.0	....	8.5	8.4	1.2
Non-operating income	0.7	0.7	....	1.6	1.1	45.5	0.9	0.7	28.6
Gross income	8.7	8.6	1.2	13.6	13.01	3.8	9.4	9.1	3.3
Deductions from gross income	7.6	7.7	*1.3*	9.6	9.1	5.5	7.8	7.9	1.3
Net income	1.1	0.9	22.2	4.0	4.0	....	1.6	1.2	33.3
Per cent: Gross income to fixed charges	115.5	110.9	4.1	141.2	145.2	2.8	119.4	115.8	3.1
Ratio: Net income to operatingrevenue	2.7	2.2	2.3	7.9	9.2	14.6	3.6	3.1	16.1

Public Service Railway Valuation Announced

$125,000,000 Fixed for Rate Making Purposes as Value of Property and Business Employed for Public Convenience

The value of the property and business of the Public Service Railway, Newark, N. J., as of Jan. 1, 1921, employed for the public convenience is $125,000,000 with an operating efficiency of the physical property and organization of 86 per cent. This is the judgment of Ford, Bacon & Davis, engineers, New York, who were employed by the street railway valuation commission of New Jersey, Aug. 30, 1920. "Value of Service" is the test applied.

THE engineers were instructed to ascertain and determine the value of all the property, including every proper and lawful element thereof, of the Public Service Railway, in accordance with Chapter 351, Laws of 1920, State of New Jersey. The members of the valuation commission are Edward E. Edwards, governor, William T. Read, State Treasurer, and Newton A. K. Bugbee, Comptroller.

On April 11, 1921, Ford, Bacon & Davis transmitted their complete and detailed report covering the valuation for use in fixing rates under existing laws, an abstract of which follows: In arriving at the final figure representing the value of the railway property they have been guided by the decision of the Supreme Court of the United States in Smyth vs. Ames "what the company is entitled to ask is a fair return upon the value of that which it employs for the public convenience"; in other words, the valuation submitted includes only so much of the business and property of the Public Service Railway as it employs for the public convenience and excludes any so-called element of franchise value. The valuation also excludes the property of the Public Service Railroad.

The unamortised cost of the superseded property, which has been discarded due to obsolescense or inadequacy was found to be $4,701,943 and the reproduction cost of the property not used in operation based on Sept. 1, 1920 prices for labor and material was $645,593. Both of these figures are given in order to comply with the law, which calls for a determination of the value of all of the property.

The cost of the property as a going concern built up from actual expenditures of the company as revealed by its records, in other words the historical cost, was $119,150,163.

The report says that it seems to have been the practice in the past to attempt to determine the value of a public utility without regard to the value of the service rendered to the public, placing "as it were, the cart before the horse, and resulting in there being no real foundation for the values thus attempted to be established." If the value of the service rendered is once established, the value of the property devoted to the public use is readily determined by ordinary economic considerations. The value of service consists of the normal cost of rendering such service plus the profit necessary to induce capital to flow into the business.

The cost of service as defined includes operating expenses, plus depreciation, allowance for obsolescence where changes in the art are taking place or where the industry is growing at a rapid rate, taxes and interest on an amount sufficient to produce a modern plant and facilities for furnishing the equivalent service in an efficient and economical manner; such amount not being limited to simply the cost of the physical structure but including all costs incident to organization before and after the physical structure is functioning, and in addition thereto, generally, losses incurred during early operation which are more or less inherent in every form of business activity and are characteristic of public utilities. To this cost should be added a profit in sufficient amount to induce capital to flow into the industry.

In the findings of fact as to value no investigation was made of whether the property had in any measure been built up from past earnings or from money furnished from other sources, such as the sale of securities. This follows the ruling of the Board of Public Utility Commissioners in the Passaic Gas Case, approved by the Court of Errors and Appeals of New Jersey, which states that "deferred regulation is no excuse for refusing at present to allow a fair return upon what is the lawful property of the company."

Value is defined as the desirability or worth of a thing as compared with the desirability of something else; often confused with the qualities and circumstances on which, taken together, such desirability depends. The economic concept of value is definite and can have but one meaning, whether it is value for condemnation purposes, value in a confiscation case, value for rate making purposes or value for barter and exchange. This conception of value was recognized by the Supreme Court of the United States in 1894 in a decision rendered by Justice Brewer in Regan vs. Farmers Loan & Trust Company.

The value of an ordinary freely competitive commercial or industrial enterprise is dependent upon the value of its product or service. The engineers make a distinction between a freely competitive industry and a monopolistic organization, in which latter class public utilities were said to belong.

These more or less monopolistic enterprises, such as public utilities, instead of being regulated by the economic law of supply and demand, are kept in check by artificial restraints of the law. If the regulation proceeds to a point where the return permitted the property devoted to public use is less than that available for money invested in a competitive and unregulated industry (safety of investment being equal), value is impaired and property is taken without just compensation and the public service is itself injured as the extension of facilities is curtailed.

There is not much probability, at least in the near future, that prices for labor and material will revert to anywhere near the pre-war basis and consequently due consideration was given to existing prices in computing the value of the property. Taking cognizance of the present prices was in line with recent New Jersey decisions.

In conclusion the report stated that while an estimate of the amount of superseded property and non-operative property had been made, such allowance was not included in the final figure. Superseded property should be given consideration in the fixing of future rates if investigation proves that past rates fixed by regulation had been inadequate to give a fair return over reasonable allowances for obsolescence caused by the growth of business or changes in the art.

The property of the Railway Company was found to be on the whole well maintained except in a few instances where the physical property was not in the best operating condition, but where the condition can be remedied by the expenditure of a comparatively small sum. It was the opinion of the engineers that it would be impossible to produce a theoretical modern plant at very much less than the cost of reproducing the existing plant of the Railway Company. An analysis of the operating statements submitted by the company and a comparison with those of other street railways indicated an efficient operating organization. The report drew attention to certain economies which might be effected in several departments of the company, which would somewhat reduce operating expenses. These economies, it was added, were all given due weight in the engineers' conclusions as to the operating efficiency.

	Labor and Material	
Elements as of Jan. 1, 1921	Average Pre-war Prices	Sept 1, 1920 Prices
Reproduction cost new of the property as a going concern..	$88,815,887	$189,489,560
Accrued depreciation of the physical property............	14,922,144	33,646,737
Minimum value of power lease..........................	11,194,000	19,149,000
Reproduction cost of property not used in operation.......	....	645,593

New Jersey Valuation Act Amended

The valuation act of New Jersey under which the preceding report was made provided that the valuation so found should be accepted as final for rate-making purpose, no means for review being included in the act. Mainly because of the lack of any review provision Governor Edwards vetoed the measure. It was promptly repassed over his dissent. Agitation was kept up for the inclusion of some means of review in the measure and at the present session of the Legislature the act of 1920 was amended so as to provide "that such valuation shall be subject to review on certiorari." Provision is further included now for cross-examination by representatives of the municipalities and others before the Board of Public Utility Commissioners of the authors of any such valuation. Hearings on applications for rate increases for electric railways are also to be given preference in their consideration over matters of routine pending before the commission. The amendments have been approved by the Governor.

Governor Urges Valuation Based on Earning Power

Governor Miller of New York has discovered that the transit relief legislation passed at his behest does not guard the public interest sufficiently in the provision which it makes for transit valuations. In consequence he rushed to the Legislature on April 13 a special message on this matter urging haste in the enactment of the amendment to the so-called Knight-Adler law now suggested as the law-making body is to adjourn within a few days.

The emergency message was one of more than 1,000 words. The Governor said in part:

> The ordinary standards of physical valuation, either original or reproduction cost, less depreciation, do not meet the emergency with which we have to deal, and physical valuations, according to any standard that could be prescribed, will in most cases under existing conditions be grossly unfair to the public.
>
> It is very difficult to prescribe by statute a standard of principle of valuation that will be fair and not too inflexible. I fear in the absence of any other prescribed standard the statute as it now stands will be construed as contemplating a valuation based on physical values which, as I have said, may prove to be grossly unfair to the public.
>
> Applied to the matter in hand the valuation should be based on the estimated prospective earnings at the fare in each case which the company is permitted to charge under its franchise or contract with the city, the valuation in no case to exceed the original cost or the fair reproduction cost less depreciation of the utility property which is necessarily employed in the public service.
>
> Of course, I construe fair reproduction cost to mean such cost under normal, not abnormal, conditions.

The Senate on Wednesday passed, unanimously, a bill which provides, in part, that:

> Such valuation shall be made with due regard to the estimated prospective earning capacity of the property necessarily used in the public service at the rate or rates of fare that the company prior to the taking effect of this act was entitled to charge.

Traffic and Transportation

Winnipeg Fare Upheld

Appeal Court Unanimous in Its Finding Upholding Rights of Public Utilities Commissioner

The right of the Winnipeg (Man.) Electric Railway to charge higher fares as ordered by the Public Utilities Commissioner was sustained by the Appeal Court of Manitoba on April 4. The decision of the Appeal Court was unanimously in favor of the company on all points. Because of its sweeping and definite nature the ruling practically ends litigation arising out of the higher fares which has been pending for more than two years. The judgment is also of far-reaching effect because in several of the provinces in the Dominion of Canada there are public utility commissions.

Immediately after the judgment had been rendered the Winnipeg City Council discussed the situation and passed a resolution favoring a plan to enter into immediate negotiations with the Winnipeg Electric Railway, while at the same time authorizing the city solicitor to carry the appeal against the judgment of the Appeal Court to the Privy Council.

It is interesting to note that for some months past A. W. McLimont, vice-president of the Winnipeg Electric Railway, has been endeavoring to negotiate with the City Council with a view to settling the transportation problem in Winnipeg permanently. Alternative suggestions proposed by the company to the City Council will now form the basis of negotiations. They follow:

1. The city taking the street railway at the present time.
2. Agreeing upon the terms under which the company shall operate for the remaining period of the franchise.
3. Making an entirely new agreement, based upon service-at-cost or some similar arrangement, in which the profits of the company shall be limited and the fares to go up or down as the cost of operation increases or decreases. The control of this form of operation might be by a commission composed of representatives of the city and the company with an independent chairman.

Briefly reviewing the situation in Winnipeg it might be stated that in the fall of 1918 the company was faced with a serious financial situation on account of increased operating costs and then applied to the City Council for leave to increase fares over those stipulated in the franchise under which the company was operating.

The City Council referred the company to the Public Utilities Commission, and two interim orders were issued by the commission which also made exhaustive valuation of the company's property. This investigation extended over two years and included a complete valuation of the company's physical assets, while the company's financial history also came under review. At the end of the investigation the commissioner made a final order raising the fares as follows:

Cash fares 7 cents.
Four tickets for 25 cents.
School children seven for 25 cents.

The city appealed against this order to the Court of Appeal.

By the terms of the order allowing the appeal to be taken the point submitted to the Court of Appeal was limited to the following question, viz.: Had the Public Utilities Commissioner the necessary authority to make the order raising the fares in so far as it affects the city of Winnipeg? Provided, that on the said appeal no question should be raised or argued as to the constitutional validity of the public utilities act, or as to the validity of the appointment of the said commissioner to his office.

The controversy between the city and the company as to the public utilities act involved two questions:

1. As to whether it was within the powers of the province to enact such legislation.
2. Whether upon the construction of the act as passed, assuming it to be within the powers of the province to pass it, the commissioner had power to change the fares fixd under the franchise agreement between the city and the company. The question before the Court of Appeal in the present instance was limited to the second of these two questions, the question as to the constitutionality of the act being eliminated.

The Court of Appeal has now unanimously decided the second question by upholding the powers of the Public Utilities Commissioner to change the fares fixed by the franchise agreement.

Boston Elevated Permitted to Run Buses

The Massachusetts Department of Public Utilities has granted its approval to the petition of the Boston (Mass.) Elevated Railway for the right to own and operate auto buses for the transportation of passengers and freight. Under the Massachusetts laws, any company desiring to operate motor buses for passenger transportation must first obtain the general approval of the Department of Public Utilities and is then obliged to secure a license from the city or town in which it proposes to operate.

The Boston Elevated desires to substitute the buses for street cars on Market Street, Brighton, a part of the city of Boston, and it will therefore proceed to petition the Boston City Council for the necessary license. The company, faced with the necessity of reconstructing its track for about 1½ miles on Market Street, where the traffic is comparatively light, decided to seek permission to abandon the track and operate the buses.

Fare Extension Accepted

Company at Columbus Hopes to Be Able to Meet $3,000,000 Improvement Program

The Columbus Railway, Power & Light Company, Columbus, Ohio, has accepted the ordinance recently passed by the City Council which assures it of a continuance of the present rate of fare, authorized more than a year ago, of 6 cents cash, or five tickets for a quarter. This action was taken by the board of directors of the company on April 7 following a period of several weeks' consideration of the Council's ordinance authorizing extension of the present tariff.

Under this ordinance the company may charge the present rate of fare during the remainder of the life of the blanket franchise under which it is now operating. This terminates April 3, 1926. Under the temporary increase granted more than a year ago the company was authorized to increase the then existing fare of 3⅛ cents, with eight tickets for a quarter, to 6 cents, with five tickets for a quarter, for a period ending April 3, 1922. The new legislation accepted by the company, therefore, extends the higher rate four years.

The extension was granted on the company's showing that to return to the old rate would not only compel operation at a loss, but would preclude all possibility of restoring the financial credit of the company and prevent the carrying out of improvements and extensions demanded of it under the existing franchise.

Demands of the Council for improvements during the remainder of the franchise period, in exchange for the continued high rate contemplate a program of betterments and extensions involving a cost of $3,000,000. The directors are still somewhat dubious as to their ability to make good on this consideration, but it was decided to accept the ordinance and make the best of the situation, with the hope that conditions will get better and allow the company to make a sufficient profit to permit it to meet the demands and at the same time assure itself of an adequate credit.

Company officials have assured the men that there will be no reduction in present wages, fixed by a board of arbitration about a year ago.

Seven-Cent Injunction Upheld

Judge Evans of the United States District Court, Louisville, Ky., has refused to hear that city in the matter of dissolving the temporary restraining order preventing interference with the Louisville Railway's 7-cent fare, stating that he would entertain no motions until the United States Court of Appeals decides the case.

The city will not seek to enforce penalties for collection of 7-cent fares as provided for in the Statutes of 1869 and will not take any action against the Louisville Railway other than to file a suit in the state court to enforce the contract of the company with the city.

This announcement was the one City Attorney Lawton and his assistant, W. T. Baskett, planned to make had they been allowed by Judge Evans to make a motion to dissolve the 7-cent injunction.

The city contends that the injunction hangs on the ground that the city might enforce the penalties against the company. Claim was made that the question of contract should be tried out in a state court, it having no place in a federal court.

Fares Reduced 50 per Cent

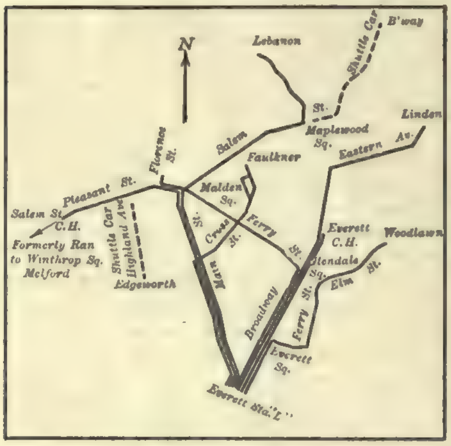
The Boston (Mass.) Elevated Railway on March 26 established a 5-cent local fare in Everett and Malden on the seven surface routes feeding the terminal of the elevated line at Everett, shown in the accompanying map.

Some idea of the service rendered and the length of the rides possible for the 5-cent fare are given in the accompanying table.

SERVICE ON BOSTON ELEVATED RAILWAY FROM EVERETT STATION

Surface Route	Length of Route (One-Way Distance) Miles	Week-Day Schedule Cars Nor.	Rush	Headway Nor.	Rush	Sunday Schedule Cars	Headway
Lebanon St.	4.099	5	11	10	5	5	10
Salem St., C. H.	3.405	5	15	10	3	5	10
Florence St.	3.348	5	5	10	10	5	10
Faulkner	2.665	3	7	15	6	3	15
Everett, C. H.	1.948	2	11	20	3	..	..
Linden	3.535	2	6	20	7½	5	10
Woodlawn	2.519	3	7	12	6	3	15

The Highland Avenue and Salem Street routes are changed to stub and shuttle routes instead of running to the terminal as heretofore. On these routes Brill single-truck safety cars are operated on a thirty-minute headway during normal hours, and on a 20-25 minute headway during rush hours.



EVERETT AND MALDEN 5-CENT FARE DISTRICT

Freight Delays Penalized.—The Public Service Commission of Indiana has authorized all interurban companies operating in Indiana to increase freight storage rates 1 cent a pound for every twenty-four hours. The increase was made as a penalty to cause shippers to move goods promptly.

Five-Cent Fare Denied in San Antonio

United States Supreme Court Holds that a Confiscatory Rate There Will Not Stand as City Did Not Have Franchise Power

In the case of the city of San Antonio vs. the San Antonio Public Service Company, the Supreme Court of the United States on April 11 affirmed the action of the lower court in enjoining the city of San Antonio from enforcing a 5-cent fare against the San Antonio Public Service Company. The decision is regarded as far-reaching in its consequence in Texas at least.

THE lower court contended and the Supreme Court concurs that the right to enforce such a rate was not secured by the city by contract and such enforcement was beyond the power of the city because it would mean the confiscation of the property of the railway which would result in violation of the fourteenth amendment of the Constitution of the United States.

In March, 1899, the City of San Antonio by ordinance extended to July 1, 1940, the franchise of the San Antonio Gas Company, the Mutual Electric Light Company, the San Antonio Street Railway and the San Antonio Edison Company. The ordinance provided, among other things, that the two last-named companies which operated railways in the city were to charge a 5-cent fare for one continuous ride over any one of their lines with one transfer to or from either line to the other.

In April, 1900, all the property of the two railway companies was sold under a decree of a state court to the San Antonio Traction Company, and that company with the approval of the city thereafter controlled and carried on both lines.

In 1903 the state enacted a half-fare law making it the duty of the traction company to carry school children and students for half fare and subsequently an ordinance was passed by the city in furtherance of this law. The company refused to carry out this legislation on the ground that it impaired the obligation of its contract as to the rate of fare resulting from the city ordinance of San Antonio of 1899 in violation of the state and Federal constitutions.

A suit by mandamus to compel it to do so was begun by an individual, and from a ruling adverse to the company's contention, the case was taken to the Court of Civil Appeals. That court held that it was unnecessary to consider whether the rate requirement was a contract because it was adopted long after the provision of the state constitution that "no irrevocable or uncontrollable grant of special privileges or immunities shall be made."

The final decree just rendered enjoins the city from interfering with the complainant in substituting a 7-cent fare and besides enjoins the city from enforcing the various ordinances complained of in the bill prohibiting and punishing the charging of a higher rate than 5 cents. The decree, however, reserves the right to the city to ask relief whenever, because of a change in conditions, the 5-cent fare should cease to be confiscatory. In addition the enforcement of the city ordinance imposing the half-fare rate for school children was enjoined, although the continued enforcement of the state half-fare law, which had been upheld, was expressly declared by the Supreme Court not to be restrained.

Continuing the opinion says:

> That in view of the admitted fact of confiscation the court had power to deal with the subject is too clear for anything but the statement. And we think it is equally clear that the right to regulate gives no power whatever to violate the constitution by enforcing a confiscatory rate, a result which could only be sustained as a consequence of a duty to pay such rate arising from the obligations of a contract, it follows that the solitary question to be considered is whether a contract existed empowering the city to enforce the confiscatory rate.
>
> Primarily the answer to that question must depend upon whether the ordinance of 1899 fixing the 5-cent rate was a contract. That it was not and could not be, we are of opinion, is the necessary result of the provision * * * of the state constitution, which existed in 1899, prohibiting "any irrevocable or uncontrollable grant of special privileges," when considered in the light of the irrevocable and uncontrollable elements which must necessarily inhere in the ordinance of 1899 to give it the contract consequence relied upon. * * *
>
> The fact is that all contentions of the city as to obligation of contract as to the 1899 rates illustrate the plainly erroneous theory upon which the entire argument of the city proceeds; that is, that limitations by contract upon the power of government to regulate the rates to be charged by a public service corporation are to be implied for the purpose of sustaining the confiscation of private property.

Increase Asked in Workingmen's Fare

An increase of 80 cents a month in the fare for Rock Island arsenal workingmen has been asked by the Tri-City Railway, Davenport, Ia. The men have been buying tickets for $2.80 per month, good to and from the arsenal as many times a month as their work there requires.

Figured on the basis of twenty-six working days a month, the average number, and two rides a day, the new fare schedule petitioned for would be approximately 7 cents a ride. This increase is proportionate to the raise from 7 to 9 cents on city lines in Davenport, Rock Island and Moline.

Franchise Rate Valid

The Iowa Supreme Court Decision Affects Both the Des Moines and Ottumwa Railways

The railway question at Des Moines, Iowa, has been thrown wide open again with the dismissal last week on motion of the Ottumwa Railway & Light Company of its appeal to the Iowa Supreme Court on the fare case at Ottumwa. The Ottumwa case is expected to have a direct bearing upon the rate in Des Moines by reason of the fact that Judge Martin J. Wade, of the Federal court, in granting the receivers for the Des Moines City Railway the 8-cent fare ruled as follows:

> If the Supreme Court of this State changes its former decision and holds a franchise rate valid this fare will be changed. The court will bow to the highest court of this State as it did in the 6-cent fare decision.

By its dismissal of the appeal the Iowa Supreme Court wiped out its previous decisions, and the legal battle is restored to the District Court, which previously upheld the city of Ottumwa in its contention that a 5-cent fare should be charged.

ALLOWED TO INCREASE RATES AS A WAR MEASURE

The Ottumwa case has dragged along in the courts for several years. The Ottumwa franchise provided for a 5-cent fare, but as a war measure the City Council allowed the company to charge 6 cents. With the coming of peace the city sought to restore the 5-cent fare, which was objected to by the Ottumwa Railway & Light Company on the ground of increased costs. When the case was appealed to the Supreme Court that tribunal sustained the ruling of the lower court, but on a rehearing the higher court reversed itself. The city then asked a new hearing and the dismissal of its case was asked by the Ottumwa Railway & Light Company.

Attorneys for the city of Des Moines state that as soon as possible they will make formal application to Judge Wade for an order restoring the 5-cent fare in Des Moines.

The Des Moines City Railway, through A. W. Harris, of the Harris Trust Company, which controls the company, has announced that unless the bus competition is eliminated the company will soon have to suspend operation. Mr. Harris made the above statement to the Greater Des Moines committee in proposing a service-at-cost feature of a new franchise proposal. The Greater Des Moines committee agreed to sponsor the movement and efforts were made to bring about a meeting of the City Council and attorneys and officials of the company. However, Mayor Barton declined to accept the invitation of the Greater Des Moines committee unless the meetings were in the City Council chamber and were open to the public. To date not progress has been made.

The battle between the buses and the electric railway is going on merrily in the meantime and each side is using newspaper advertising in an effort to place its story before the people.

Ten-Cent Fare Plea Heard

The hearing on the application of the Trenton & Mercer County Traction Corporation, Trenton, N. J., to increase its fares from 7 cents to 10 cents was begun before the Board of Public Utility Commissioners on April 5. Rankin Johnson, president, stated that interest on bonds was defaulted on April 1 and that there are no funds with which to pay interest falling due on May 1. He said that in consequence there was a possibility that ninety cars serving as security for the bonds would be seized by the trustees under the mortgagee, leaving only thirty cars with which to maintain schedules. Mr. Johnson insisted that unless assistance is forthcoming immediately the system will have to pass into the hands of a receiver.

Even with an increased rate, Mr. Johnson said, the receipts of the corporation would fall approximately $50,000 short of the sum required to meet expenses for the first year. He thought a higher fare would result in a falling off of not more than 5 per cent in the number of passengers, and that this would be but temporary.

Although the system is not confronted by jitney competition, Mr. Johnson declared that the receipts were undoubtedly affected by what he characterized as "private automobile competition." He testified that the corporation enjoys the advantage of a wage agreement slightly lower than that under which the Public Service Railway is working and also less than that prevailing in other cities similar in size to Trenton.

Transportation News Notes

Special Mid-day Fares Help Traffic.—It is announced that the cheap mid-day fares on the London County Council Tramways have so stimulated traffic as to produce substantial financial benefit.

Seeks Higher Fare.—The Wisconsin Traction, Light, Heat & Power Company, Appleton, Wis., has applied to the State Railroad Commission for permission to increase its lighting, power and street car rates.

City Proud of Its Five-Cent Fare.—Cars of the Lincoln (Ill.) Municipal Railway are to carry placards announcing a 5-cent fare, primarily for the edification of the visitor to that city as an advertisement of economical management of a municipal enterprise.

Railway and Jitney Schedules Articulated.—The Board of Aldermen of Dover, N. J., has passed an ordinance compelling jitney operators to pay a license fee of $100 a year and to arrange schedules so they interpolate those of the Morris County Traction Company.

Ferry-Railway Transfers Urged.—David W. Henderson, superintendent of the Seattle (Wash.) Municipal Railway, has refused to commit himself as to what the attitude of his office would be regarding the matter of entering into an agreement with the operators of the Elliott Bay ferry to West Seattle for the exchange of transfers from the cars to the ferry and from the ferry to the cars. A petition signed by several hundred citizens of West Seattle urges that the city take action to secure a transfer arrangement in order that the ferry, which is now losing money, may continue to operate.

Denver Tramways Seeks Fare Increase.—Application for a 20 per cent increase in interurban fares has been made by Ernest Stenger, receiver of the Denver (Col.) Tramway, to the Colorado Public Utilities Commission. The increased fares would affect traffic on the Denver-Golden and Denver-Lyden lines. In his petition to the commission Receiver Stenger points out that the increase would make the tramway fare to Golden the same as is now charged on the Denver & Intermountain line. Since Aug. 6, 1918, when the commission granted the city tramway a 7-cent fare, it has been charging 7 cents on its interurban lines.

P. R. T. Asks Continuation of Present Fare. — The Philadelphia (Pa.) Rapid Transit Company has filed at Harrisburg an application with the Public Service Commission for a continuance of the four-ticket-for-a-quarter tariff now in effect. If the request is granted, the present rates of fare would be continued after May 1, fixed as the time limit for the present tariff granted by the commission on Nov. 1. Valuation proceedings now under way will, it is expected, be completed within three months. The value fixed will determine the amount of returns to which the company is entitled and in that manner, will also fix the permanent rate of fare to be charged by the company.

Injunction Against Jitney Ordinance Denied.—Judge Hall at Kansas City, Mo., has refused to grant a permanent injunction restraining the enforcement of the ordinance prohibiting jitneys from operating on streets where electric railway cars are run. Jitneys began operating on April 7 over new routes away from rail lines. These routes took the jitneys through Eleventh Street, known as Petticoat Lane, the chief east and west shopping street. Merchants protested against congestion on this thoroughfare and Mayor Cowgill immediately ordered the jitney inspector to change this routing, and by noon jitneys were eliminated from that street. The Kansas City Railway had extra cars in service and speeded up schedules in response to the new conditions.

Personal Mention

Joins Consulting Firm

Mr. Litchfield, Formerly Engineer of the American Car & Foundry Company, Joins Gibbs & Hill

Norman Litchfield, who for the last three years has been mechanical engineer of the American Car & Foundry Company, New York, has resigned to join the staff of Gibbs & Hill, consulting engineers. He will devote special attention to electric locomotive and car equipment work. This will not be Mr. Litchfield's first experience in consulting work, for at one time he worked under L. B. Stillwell in the preparation of plans for the equipment of the New York subways.

During the period that experimental work was being carried on by Mr. Stillwell with the cars that had been designed for the subway Mr. Litchfield had charge of the tests. When the operation of the subway began he joined the engineering staff of the Interborough Rapid Transit Company, with which he was connected for a good many years. Previous to his association with Mr. Stillwell he served his apprenticeship in electric railroading in the shops of the Brooklyn Rapid Transit Company. He was graduated from Stevens Institute of Technology in 1901 with the degree of mechanical engineer.

NORMAN LITCHFIELD

Mr. Litchfield has been a very valuable contributor to the JOURNAL. He has written a great many articles on technical subjects dealing particularly with the fundamentals and details of car bodies and truck construction. In 1920 the JOURNAL began the publication of a series of articles by Mr. Litchfield on railway car materials. These were written with the idea that the ordinary mechanical man of a railway is confused when seeking specific information by the vast amount of material confronting him. It was also felt that a better understanding of the characteristics of various materials used in car construction would result in simpler and more uniform specifications being drawn up for car builders, and in this way cause a step toward standardization to be taken to effect greater economies in materials and cost.

Mr. Litchfield has been actively interested in the work of the American Electric Railway Engineering Association and served as its secretary for a number of years. He is also a member of the executive and standards committees of the association.

Los Angeles Railway Has an Official Question Target

George E. Ferguson has been made special representative of R. B. Hill, superintendent of operation of the Los Angeles (Cal.) Railway. This is a new position which has been created so that there might be some one to help the trainmen in their work.

Mr. Ferguson will go from one division to another unannounced and at different times of the day to talk over with the trainmen in an informal way any of the points about which they may wish to question him. In this capacity he will also meet the men around the assembly room and discuss service with them on their own ground instead of over a desk top. This method, it is hoped, will give a personal touch under which everyone will feel free to discuss matters for the betterment of service.

Mr. Ferguson has been with the Los Angeles Railway since 1905, and has served in practically every section of the operating department. This experience makes him well able to give correct information on questions pertaining to any phase of a trainman's work. At the time of his appointment Mr. Ferguson was in the schedule department.

Mr. Trazzare, Publicity Manager of Georgia Railways, Resigns

J. F. Trazzare, manager of publicity department of the Georgia Railway & Light Company, Atlanta, Ga., severed his connection with the company on April 1. This was occasioned by the reorganization of some of the work of the company along the lines of publicity, safety and employment, all of which had been under Mr. Trazzare's direction. In the interests of economy the company has discontinued these as separate departments. The safety work of the company has been placed under the direction of F. L. Butler, the new general manager of railways.

Up to the present time no definite publicity organization has been effected. Meanwhile the publicity work of the company will be handled by Mr. Atkinson, chairman of the board of directors, and Mr. Arkwright, president of the company.

W. R. Dunham, Jr., Resigns

Former Connecticut Company Engineer Joins Construction Firm of Engel & Hevenor

William R. Dunham, Jr., resigned as engineer of maintenance-of-way of the Connecticut Company, New Haven, Conn., on April 15 to become chief engineer for the firm of Engel & Hevenor, contracting engineers, New York City, and for H. P. Hevenor, a member of the firm, in his private engineering practice.

Mr. Dunham is rounding out thirty years of engineering work in the electric railway field, which he entered as a student in an engineering office in Providence, R. I., where work was done for the Union Railroad, a horse railway of that city. When the railway organized its own engineering department Mr. Dunham joined it, and as the system developed he was rapidly promoted. When, in 1893, the Union Railroad was merged in the United Traction & Electric Company he became principal assistant in track matters.

W. R. DUNHAM, JR.

In 1902, when the United Gas Improvement Company took over the Providence property and formed the Rhode Island Company, Mr. Dunham's duties were radically changed for a time. Due to his familiarity with the layout of the property he was assigned to develop a system of transfers, for which purpose a new department was formed. However, two years later he went back with the engineering department in charge of all civil engineering matters.

In 1906 Mr. Dunham went to New Haven to become assistant engineer in the maintenance-of-way department of the Consolidated Railway (now the Connecticut Company), becoming engineer of maintenance-of-way in July, 1914, which position he has held ever since. In this position he did most valuable construction, maintenance and valuation work. Recently he was an appraiser of the property of the Shore Line Electric Railway, Norwich, Conn., and also assisted the Public Utilities Commission of Connecticut in valuation work.

During his engineering career Mr. Dunham has taken an active part in the affairs of engineering and other associations. He has been a member of the American Electric Railway Association since 1915, and was president of the Connecticut Company local section of that association. He has been a member of the A. S. C. E. since 1906, and was chairman of the committee which formed a local section of that body. He is a past-president of the Connecticut Society of Civil Engineers. He is also an active member of the American Association of Engineers, of the New Haven Railroad Club, and of the New England Street Railway Club. In leaving the operating railway field Mr. Dunham will have occasion to keep up his affiliation with most of these organizations, for the firm of Engel & Hevenor does much electric railway construction work.

No successor to Mr. Dunham will be named for it is intended to leave his former position vacant indefinitely. The three division engineers who formerly were required to report to him as engineer of maintenance-of-way will now be responsible to General Manager J. K. Punderford.

R. S. Moore has resigned as vice-president in charge of the New England investment business of the Byllesby Engineering & Management Corporation.

J. W. Ellingson, traffic manager of the Utah-Idaho Central Railroad, Ogden, Utah, resigned March 1, to become traffic manager of the Amalgamated Sugar Company.

J. M. Martin has been appointed auditor for the Piedmont & Northern Railway, Charlotte, N. C., to succeed Bond Anderson, who resigned April 1 to engage in private business. Mr. Martin has been head bookkeeper in the office of the Piedmont & Northern for the past several years, and will have charge of the general auditing of the company.

Edward M. Moore has been appointed by Director Twining as private secretary to the director of the City Transit Department of Philadelphia, Pa. The former private secretary to the director was John Egan. He resigned many months ago and no appointment was made to the vacancy until the choice of Mr. Moore, who is a son of Mayor Moore of Philadelphia.

C. W. Loughry will succeed Frank P. Litschert as secretary of the Public Service Commission of Indiana on May 1. The new secretary is a graduate of Indiana University and the Indiana University Law School. Mr. Litschert, who will retire as secretary of the commission, was private secretary of ex-Governor Goodrich and his appointment to the service body place was a temporary one following the resignation of Carl Mote at the end of the Goodrich administration.

Hilding Angstrom, chief engineer of traction lines of Malmoe, Sweden, a city of 150,000, was in Terre Haute, Ind., recently inspecting the Terre Haute traction plant and system, and giving special attention to the little green cars. He said to E. M. Walker, general manager: "I came to Terre Haute for the reason that I was told that progressive traction methods are being worked out here. Your shops and plants show efficiency, even by a casual visit. I believe the small cars are the traction solution for short hauls and for lines which do not encounter trying topographic and other hard conditions."

A. P. Patterson, appointed acting general superintendent of the railway department of the New Orleans Railways & Light Company, New Orleans, La., to fill the vacancy caused by the resignation of N. H. Brown, entered utility work in 1905 as general manager of the street railway, electric and gas properties in Meridian, Miss. He remained there until December, 1917. From 1910, when Henry L. Doherty & Company purchased these properties, until he left the Doherty interests, he was called upon to make examinations and valuations of a number of other properties. During 1918 and 1919 Mr. Patterson was engaged in a private engineering business which, on Jan. 1, 1920, he sold to accept a position with J. K. Newman, New Orleans, La., chairman of the bondholders' committee of the American City Company, New York. Through that connection he was assigned certain duties with the New Orleans Railway & Light Company and upon the resignation of N. H. Brown, was appointed acting general superintendent of the railway department.

Obituary

Warren G. Bristol, Manager

Warren G. Bristol, manager of the Hartford lines of the Connecticut Company, is dead. His body was found in Keney Park, Hartford, Conn., with his temple pierced by a revolver bullet. His death came as a great shock to the community and to his many friends, for Mr. Bristol was highly appreciated both as a man and for his ability as a railway manager. His associates had the highest regard for him. He was extremely popular among the employees and knew hundreds of trolley crews personally.

Not long ago, before a public gathering, he expressed great faith in the future of the electric railway. At that time he said:

> I have devoted my life to the trolley business, and it might appear to some as if in the later years of my life I might be discouraged at the outlook, but I look for a re-establishment of the trolley companies in the public favor, and do not believe the time has come or will come in the near future when jitneys and motor buses will take the place of the trolley systems. There is such an urgent need for trolleys to obtain the development of outlying district that I think within a few years there will be a great expansion of the trolley lines.

Mr. Bristol's first affiliation with street railways dates from October, 1893, when he was engineer of the construction crew which was engaged in building the trolley line between Meriden, Conn., and Wallingford. At that time he was under Norman McD. Crawford, who is now vice-president and treasurer of the Columbus Railway, Power & Light Company, Columbus, Ohio. When the line was completed he remained at Meriden as assistant to the superintendent and a year later, when the road was purchased by the New York, New Haven & Hartford Railroad Company, he himself became superintendent.

For about ten years Mr. Bristol was superintendent of the lines in the vicinity of Meriden. His career there was marked with success and when the opportunity offered itself in February, 1906, his superiors transferred him to Hartford as manager of the local lines covering a territory of 164 miles. It was this position that he held at the time of his death to the mutual satisfaction of city and company officials and the traveling public.

Some years ago he showed himself possessed of inventive genius and, in the interests of his company, developed and perfected the four-section stone and dump car, which is known as the Bristol multiple-body dump car. This type of car is used extensively on the Connecticut Company's system for the quick transportation and disposition of crushed stone, gravel and earth. Because of the compartments and mechanical devices for dumping, it makes possible the discharging of loads along the trolley routes where construction or repair work is in progress without delaying passenger traffic.

Mr. Bristol was born in Cheshire, Conn., on April 21, 1873. He received his early education in that town and was afterward graduated from the Yale Business College in New Haven, Conn. He was popular in railway circles, having served as vice-president of the New England Street Railway Club for one year and, in November, 1917, was elected president of the Connecticut Company Section No. 7, A. E. R. A.

Ferdinand O. Reed, chief ticket clerk of the Portland Railway, Light & Power Company, Portland, Ore., for the last eight years, died suddenly in that city on Feb. 18.

J. J. Swan, who had held the position as chief of the appointment bureau in the transportation department of the New York (N. Y.) Railways, died recently while on his way to his office. Mr. Swan was well known in and about New York City because of his long service with that company, which extended over a period of thirty-nine years.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,
SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Brake Shoe Prices About $12 Less per Ton Since Jan. 1

Market Is Quiet with Producers Making Prompt Deliveries and Curtailing Present Good Stocks

The market for brake shoes presents much the same features as other railway equipment lines at this time. Stocks of finished material are large—too much so for a declining market, and producers are therefore following a retrenchment policy on production. Deliveries are, of course, immediate.

Buying for the most part is for immediate needs only and though the outlook seems to be that the brake shoe market has passed its lowest point and hence is somewhat optimistic in tone, there does not seem much chance that sales will equal those of last year. It is quite possible that a good demand will develop this fall, however. The replacement of wornout brake shoes, which is undoubtedly the chief factor in buying, has been one of the points upon which railways, especially steam, have economized. Many of the large number of idle freight cars on steam roads have been stripped of brake shoes, it is reported, to care for the rolling stock in actual operation. In the electric railway field this condition is of course not true and there the buying is said to be proportionately greater, some traction companies carrying from a two to three months' supply.

The second reduction this year in brake shoe prices was recently announced by one of the leading interests. The cut, which was effective April 1, was in the same amount as the previous decrease of Jan. 1, or about 8½ per cent. This is equivalent to a drop of $6 per ton. The further price trend is largely dependent on malleable iron and labor costs, though it should be remembered that brake shoes have been advanced in price since before the war less than almost any other item of railway equipment.

Electrical Exports for February Hold Up Well

February's electrical exports, although they were $2,000,000 under those of January, a record month, amounted to $13,632,478. Last October the exports took a decided jump of more than two million and in November went over the ten million mark. December was over thirteen millions, January was over fifteen millions and February is holding up well.

Total exports of January and February amount to $28,965,433. It took four months of last year to approach this figure. The year 1916 was the first year to bring in total exports higher than those of the first two months of 1921, which were nearly thirty millions. Last year's total was $102,618,508, and if 1921 continues at its present rate the total will yield over $170,000,000. With all the slump in the general exporting market it appears that the electrical industry is holding up its end of the game in a very encouraging way. American electric railway products have always held an important place in supplying South American markets especially.

Corporation Reduces Prices on Many Steel Products

Effective Immediately, Prices Are from $1.50 to $15 a Ton Lower Than Former Schedule, a Decrease of from 3.8 to 17 per Cent

Effective at once a reduction in prices of many steel products ranging from $1.50 to $15 a ton was announced on Tuesday by Judge E. H. Gary, chairman of the Board, for the United States Steel Corporation. This supersedes the schedule to which the corporation has been adhering since its approval by the Industrial Board in March, 1919. Reductions on tubular goods and on sheets, it is stated, have not been completed and will probably be announced within the next few weeks. Steel rails and wire nails are unchanged.

In comparison with the former schedule the new prices effect a reduction of $9 a ton in plates, $5 a ton in structural steel, $5 in bars, $9 in wire rods, $7 for plain wire, $8 for sheet bars and small billets, $4 for slabs, $1.50 for 4 x 4 and heavier billets and $15 a ton for tin plates.

Independent mills have until last winter been holding to a schedule higher than that of the corporation, but last November a downward trend commenced in hope of stimulating business. Although this finally brought independent prices below those of the corporation it also brought little new business. It has been a common expression among the trade that a reduction in price by the leading interest would prove a stimulant not only to the steel industry but also to all industry, and particularly to building. It remains to be seen now what effect this cut of late last Tuesday will have.

No statement was made that wages in the corporation mills would be reduced in line with the prices of steel but it is believed in many quarters that this action will be taken in the near future.

Ten per Cent Reduction on Line Hardware

Manufacturer's Decrease of 7½ per Cent Passed on at Higher Figure by Jobbers

Pole-line hardware prices have again taken a drop. The reduction as announced by a leading manufacturer, effective April 11, amounts to about 7½ per cent, but this cut has been passed on by jobbers and distributers on an average of about 10 per cent. Other manufacturers are expected to follow suit in reducing quotations.

Prices quoted to electric railways and central stations by jobbers on representative material, f.o.b. Chicago, are as follows: Carriage bolts, ⅝ in. x 4½ in., $2.25 per 100, compared with $2.45 previously; cross-arm braces, 1¼ in. x ¼ in. x 28 in., $13.25 per 100 as compared with $15; machine bolts, ⅝ in. x 12 in., $9.95 per 100 as against $11.15. Lag screws, 1½ in. x 4 in., are now priced at $4.25. General price reductions of from 5 to 7½ per cent were made on line hardware the middle of last February, and previous to that decreases of 5 to 15 per cent had been made during December and early January, so this is the third decided reduction in hardware prices that producers have made.

In general consumers have not entered the market very actively this spring, although demand from power companies is said to be increasing recently. As a result of the quiet market producers are only operating at from 50 to 75 per cent of capacity. Reserve stocks are sufficient to care for all immediate needs with prompt shipments.

Crossarms Drop Ten per Cent in Price

The Third Reduction Which Has Been Made This Year Should Provide Stimulus to Buying

Following the price reduction of 9 to 15 per cent on Rainier fir and longleaf yellow pine crossarms that was made on March 1, as announced in the March 12 number of the ELECTRIC RAILWAY JOURNAL, prices have again been reduced. The decrease, which is effective April 11, amounts to about 10 per cent and applies to the representative prices that were quoted in the March 12 issue. This is the third general price reduction inside of two months and a half, the first, on Feb. 1, amounting to 15 per cent.

It is hoped that this latest price decrease will serve as a stimulus to demand, especially as it comes at a time when kindred lines, such as poles and line hardware, are also reduced. Up to the present time the market has remained very quiet, and although stocks are good and deliveries prompt consumers have not followed up their inquiries by ordering but have preferred to hold off buying, presumably, until they think prices have reached a level low enough to represent a good buy.

Sweeping Price Reduction on Western Cedar Poles

Freight Rate Also Declines Slightly—Demand Seems on the Increase, with Good Stocks and Prompt Shipments

In order to do their share in bringing general prices to a level which will command public confidence and stimulate new activity in the industry, producers of Western red-cedar poles have announced decided price reductions. The extent of the cut, which was effective April 6, ranges in general from about 15 to 22 per cent. The new prices as compared with the old quotations on representative sizes are as follows: F.o.b. Chicago, 30-ft., 7-in. top, $8.50, $10.90; 35-ft., 8-in. top, $14.30, $16.25; 40-ft., 8-in. top, $16.80, $19.80. The same poles f.o.b. New York show the following new prices compared with the old: 30-ft., 7-in. top, $9.55, $12.20; 35-ft., 8-in. top, $16.10, $18.30; 40-ft., 8-in. top, $19.15, $22.40.

ALTHOUGH PRICES ARE REDUCED, COSTS ARE STILL HIGH

In addition to this decrease there is a further reduction of 6 cents per hundredweight based on the weight of poles at time of shipment, allowable as the result of lower freight rates which went into effect on Western red cedar poles April 1. On a 35-ft., 7-in. top pole this is said to amount to about 30 to 35 cents. The action of producers in dropping their prices, it is stated, is not entirely justified by lower costs, but in view of the tendency of consumers to hold off buying it is taken in the hope that business will be stimulated thereby. Northern white-cedar poles as yet remain unchanged in price but the Southern white-cedar product was reduced about 15 per cent more than a month ago.

Demand at present is not large but seems to be on the increase, central-station companies especially showing considerable interest in the market. Electric railways are not placing many orders but producers are quite generally optimistic that before the year is out sales will have mounted to good proportions. Stocks of poles in the West are quite large, and as a result immediate shipments can be made to Eastern points. Sales west of the Mississippi are said to be in greater volume than nearer the Atlantic coast, for in the latter territory demand has in large part been supplied by local chestnut poles, which are somewhat cheaper in first cost.

Germans Again Undersell Electric Export Market

Word comes from the ELECTRIC RAILWAY JOURNAL'S correspondent in Sweden that all German business seems to be in one great muddle with no one very much concerned. Even so and with the high export fees, Germany continues to outsell everybody, thanks to the rate of exchange. The Swiss railroads, for instance, are offered Brown-Boveri electric locomotives for 1,000,000 francs apiece, while the A. E. G. offers the same thing, f.o.b. Switzerland, for 600,000 francs.

In one thing only does this correspondent find that the Germans are high and that is insulators. One very large order for the Swedish Board of Waterfalls went to an American company at a price laid down in Sweden that was lower than the Germans could meet.

Canadian Equipment Manufacturers Undersell This Country

As an instance of the difficulties which beset American manufacturers of electric railway equipment who would sell their product outside this country, the experience of a large Canadian electric railway in buying some new cars is significant. This company required twenty new street cars and called for bids in the United States and Canada. The most inviting bid was received from a well-known car manufacturer in this country and on the face of things this concern should have received the order. But when the traction company came to figure approximately 15 per cent increase in cost on the difference in exchange rates, not to mention the customs duty and the expense of a long freight haul, it found it necessary to revise its plans. Accordingly the number of cars ordered was reduced from twenty to ten, and these were equally divided between two Canadian manufacturers. The inference here is that the Canadian bids were so high that the size of the order had to be cut in half, yet the bids as accepted still represented a lower price than car manufacturers in this country could meet under the burden of exchange rates, duty cost and freight charges. According to the same source of information Canadian electric railways, which in the past have purchased much material in the United States, have now been obliged to break away almost entirely from this custom, due principally to prevailing exchange rates. The Canadian dollar is now 88½ cents.

Rolling Stock

Indianapolis (Ind.) Street Railway Company has recently had a number of open cars rebuilt by the Barney & Smith Car Company, Dayton, Ohio. The cars, which were originally built by J. G. Brill Company and which have been in use for twenty years, were inclosed and refitted for prepayment fare operation.

Franchises

Glendale & Montrose Railway, Glendale, Cal.—The Board of Trustees of the City of Glendale has given notice of the sale of the franchise of the Glendale & Montrose Railway. The franchise calls for the operation and maintaining of a street railway along certain streets of the City of Glendale for a period terminating Nov. 4, 1963.

Track and Roadway

Tidewater Southern Railway, Modesto, Cal.—Work has been started at Modesto, Cal., grading for the new route of the Tidewater Southern Railway into this city. The new road will come along the west bank of lateral four as far as Nellie Street and there cross the canal and come along Nellie, thence over P Street to Ninth and join the present tracks at the corner of Ninth and N Streets.

Columbus Railway, Power & Light Company, Columbus, Ohio. — Much of the program calling for the expenditure of $3,000,000 facing the company is extension of present lines. One project contemplates extension of service 1½ miles north of Columbus, a short distance beyond Clintonville. The company is now negotiating with the Columbus, Delaware & Marion Railway for the use of that company's tracks north of the city. Another extension is that to the suburb of Shepard, contemplating a mile of new track, while the company is also asked to extend its service on the Leonard Avenue line to Fifth Avenue, a distance of about a mile. These, in addition to much repaving work, delayed by the city because of the company's inability to do its share of the improvement, constitute the major part of the program.

San Francisco - Oakland Terminal Railways, Oakland, Cal. — The San Francisco-Oakland Terminal Railways has asked permission of the City Council of Oakland to double-track its line on Lake Shore Avenue between Prince Street and Walla Vista Avenue.

Montgomery Transit Company, Norristown, Pa.—The Montgomery Transit Company will reconstruct about 6 miles of track.

Charleston (W. Va.) Interurban Company.—The Charleston Interurban Company has been awarded a franchise by the City Council for the construction of a loop through Ruffner Avenue and the establishment of a one-man car line in this section. With the construction of the Ruffner Avenue loop one-man cars will also be placed on the Duffy Street loop.

Spokane & Eastern Railway & Power Company, Spokane, Wash.—The Spokane & Eastern Railway & Power Company and the Spokane Traction Company will spend $151,000 in improvements and replacements during 1921, according to the year's budget made by Vice-president F. E. Connors. Part of the money will be used for rehabilitation of eighteen of the traction cars to be made into one-man cars. Renewal of electric equipment will cost $20,000, maintenance of traction lines will cost $35,000, mechanical improvements $30,000, and the remainder will be spent for engineering improvements.

Seattle, Wash. — The utilities committee of the Council has voted to recommend the extension of a street railway line from the Duthie Loop on West Spokane Street north of Harbor Island, a distance of one mile, to the Todd Ship Building Company's plant at the north end of Harbor Island. The action was taken after petitions had been submitted by various firms on the island, and it was agreed that the cost of the railway, $19,000, will be advanced by the properties and firms benefited. It was agreed that eventually $9,500 of this cost will be refunded by the street railway department. During the peak hours of travel service will be taken care of by several service cars, with 45-minute trips during the rest of the day.

Windsor, Ont.—A direct car line to link up the southern sections of Windsor, Walkerville and Ford with main service is suggested.

Windsor, Ont.—Construction of street railway extension is contemplated by Hydro Electric Power Commission, Essex Division, Sandwich Street.

Montreal (Que.) Tramways. — Construction of the Mount Royal Tramway will be started this spring according to a definite announcement made by city authorities. This project has been under consideration for some time. Judge Saint Cyr, chairman of the Montreal Tramways Commission, has received a letter from E. R. Decary, chairman of the Administrative Commission, which gives definite instructions. The route will be along Shakespeare Road.

Power Houses, Shops and Buildings

Fort Wayne & Bluffton Traction Company, Fort Wayne, Ind.—Fire destroyed a substation and interlocker at the intersection of the Fort Wayne & Bluffton Traction Company's line and the Clover Leaf Railroad late April 6 with a loss of $10,000. The flames started from a short circuit in the substation.

Mesaba Railway, Virginia, Minn.—The Mesaba Railway will build one small carhouse, one substation and freight house. The railway will also purchase automatic control equipment for three substations.

Wilkes-Barre & Hazelton Railway, Hazelton, Pa. — The Wilkes-Barre & Hazelton Railway has purchased from the General Electric Company two 750-kw. 60-cycle rotaries with two three-phase transformers and a complete switchboard for automatic operation. This power equipment will not be delivered until July.

Professional Notes

G. E. Engineering Company, Inc., New York City, under date of April 1 announces the removal of its offices to 449 West Forty-second Street, a change that is made in line with the company's expansion of business.

William S. Turner & Company, Portland, Ore., announces the formation of an organization under the above name to act as manufacturers' agent for electric railway, power station, pumping and industrial plant equipment; to make reports appraisals etc.; and to design and construct public utility, municipal and manufacturing works. Mr. Turner will continue his business as consulting engineer in which he has been engaged for the past ten years. He has associated with himself among others, his son, Edmond S. Turner, a graduate of Stanford University, who will specialize in commercial engineering along electrical and mechanical lines. Among others the company is at present the representative of Heine Safety Boiler Company, De Laval Steam Turbine Company, Sanford Riley Stoker Company, C. H. Wheeler Mfg. Company and the James Leffel Company.

Trade Notes

Track Specialties Company, 29 Broadway, N. Y. City, announces the appointment of the Busch Corporation, 13 North Seventh Street, St. Louis, Mo., as its agent in that territory.

The American Engineering Company, Philadelphia, maker of the Taylor stoker, has established a Mid-Western service station at 1772 West Lafayette Boulevard, Detroit. A complete stock of parts for all sizes and types of these stokers is carried and immediate shipments will be made, it is announced.

The Canton Culvert & Silo Company, Canton, Ohio, reports two recent orders of more than usual size. A ten-carload order of "Acme" (nestable) Toncan metal culverts was shipped to a railroad in Cuba and the Pennsylvania State Highway Department, at Harrisburg, Pa., has awarded its annual contract to the company. The latter order totals approximately 52,000 lineal feet of corrugated metal culverts in various diameters, the equivalent of about thirty carloads.

Trackless Transportation Corporation announces the opening of general offices at 300 Madison Ave., N. Y. City. This newly organized firm of engineers and manufacturers of "The Imperial Omnibus" designed for twenty and thirty passengers with single-deck, and 50 passengers with double-deck, is prepared to plan, install, and supervise motorbus transportation systems and to furnish specially designed buses and equipment.

Electric Power Equipment Corporation, Philadelphia, Pa., announces the opening of a district office and warehouse at 215 Tenth Street, Huntington, West Va., under the direction of L. T. Hall, who has been superintendent of construction for the company, formerly Lewis & Roth, for several years. Formerly he was with the Brooklyn Rapid Transit Company, the Norfolk & Western Railway Company and other concerns in both operating and construction work.

New Advertising Literature

Refractories.—"Clinker Proof Furnace Walls" is the title of a folder issued by the Bernitz Furnace Appliance Company, 15 State Street, Boston.

Valves.—The Rensselaer Valve Company, Troy, N. Y., is distributing book No. 12, describing its "Rensselaer" throttle and control valves.

Trademarks.—"The Work of the Trade-Mark Bureau" is the title of a booklet distributed by Mida's Trade-Mark Bureau, Ellsworth Building, Chicago.

Shop Tools.—Buffalo (N. Y.) Forge Company is distributing a catalog on its various types of forges, drills, and machines for cutting, punching and slitting metal.

High-Tension Switches.—The Royal Electric Manufacturing Company, Chicago, is issuing bulletins Nos. 20 and 25 inclusive, describing a new line of high-tension air-break switch equipment and outdoor bus supports.

Wire.—Copper Clad Steel Company, Rankin, Pa., has issued a sheet on "Copperweld Wire," comparing it with weatherproof, strand, and bare copper wire as to weight, breaking load, resistance etc.

Blowers.—The "Coppus" turbo blowers for undergrate draft and other industrial service is described in a recent publication of the Coppus Engineering & Equipment Company, Worcester, Mass.

Heater Temperature Control.—Consolidated Car-Heating Company, Albany, N. Y., has issued a new bulletin No. 13-B, illustrating and describing its system of thermostatic control for electric heaters.

Acceptances. — "Acceptances, Trade and Bankers'" is the title of a new book just published by D. Appleton & Company, New York City, written by Park Mathewson, vice-president of the Business Bourse, New York.

Overhead Expenses. — Chamber of Commerce of the United States of America, Mills Building, Washington, D. C., has just issued a pamphlet on "Overhead Expenses: How to Distribute Them in Good and Bad Times."

Combustion.—"The Burning Question" is the title of a new book issued by the Green Engineering Company, East Chicago, Ind., dealing with the question of proper combustion. "The Green Cast Iron Hopper Book," recently issued by the company, describes the cast-iron and structural-steel hopper.

Why your Safety Cars should have The Peacock Staffless Brake

The Peacock Staffless is readily accessible

All the moving parts of the Peacock Staffless are above the floor. Should there ever be any occasion to get at them they can be readily reached simply by removing the cover of the pressed steel case. But there will never be any trouble—for there are no bevel gears and no staff to bind. Just a powerful mechanism that develops 3 times the braking power of the ordinary hand brake for the same human effort.

NATIONAL BRAKE COMPANY
890 Ellicott Square
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The Dozen Peacock Reasons

1. Saves half the space of the ordinary hand brake.
2. Weighs *less.*
3. Gives three times the braking power for the same human power.
4. Operates without binding—no staff—no bevel gears.
5. Simple in construction.
6. All operating parts above floor.
7. Invariably sure and certain in operation.
8. Insures exactly the braking power needed for any size car.
9. Graduated stops and starts.
10. Housing protects working parts from dust, dirt rain, snow.
11. Lower maintenance costs.
12. Greatest economy in the long run.

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HEIGHT OF TREATMENT

The butts of all poles shall be treated to the height as set forth in the table below.

PENETRATION RESULT

The sapwood of each and every pole shall be impregnated with the preservative to a depth of one-half inch in every portion of the pole in that area between the plane designated as the height of treatment as set forth in the table below, to a plane one and one-half feet below the standard ground line, unless the sapwood be less than one-half inch in thickness, in which case the impregnation will be to the full depth of the sapwood throughout this area.

PENETRATION TEST

The result shall be determined by making frequent tests with an increment borer, removing thereby a plug taken from this area at a point one foot below the standard ground line. The hole from which this plug is removed will then be sealed with Creosote, after which a creosoted plug will be tightly driven in.

PRESERVATIVE

The preservative shall be a pure coal-tar distillate obtained entirely from coal gas or coke-oven tar and must not contain any admixture of any other tar oil or residue obtained from petroleum or any other source, including coal-gas or coke-oven tar and must conform to the standard specification of the American Wood Preservers Association, and the American Railway Engineers Association for Creosote Oil, and the National Electric Light Association's "A" Specifications covering coal-tar creosote.

Length of Poles	Standard Ground Line	Height of Treatment
16 feet	4 feet	5 feet
18 "	4 "	5 "
20 "	4 "	5½ "
22 "	4½ "	6 "
25 "	5 "	6 "
30 "	5½ "	6½ "
35 "	6 "	7 "
40 "	6 "	7 "
45 "	6½ "	7½ "
50 "	7 "	8 "
55 "	7½ "	8½ "
60 "	8 "	9 "
65 "	8 "	9½ "
70 "	8 "	10 "
75 "	8 "	10 "
80 "	8 "	10 "

Butt-Treated
BY
PAGE & HILL Co.
1921
GUARANTEED
One-Half Inch
PENETRATION

his disc countersunk on the butt-end f every pole Butt-Treated by the P & H uaranteed Penetration Process is your ssurance of one-half inch penetration.

You Really Get This In Place of Uncertain Results

THE specifications for the P & H Guaranteed Penetration Process are not a specified method of Butt-Treatment but are specifications that produce a guaranteed one-half inch penetration result.

The result specifications printed here are not only rigidly carried out, but are also securely backed up by a written guarantee on poles butt-treated by this process. Page & Hill Co. guarantees without qualifications to refund the entire butt-treating price on every pole that does not show the prescribed ½ inch uniform penetration.

This is a radical departure from old methods. Every pole-buyer knows what this means in enabling him to keep down his pole maintenance costs.

Insist on getting the genuine, the P & H Guaranteed Penetration Process. Do not be satisfied with any substitute process.

Full Particulars on Request.

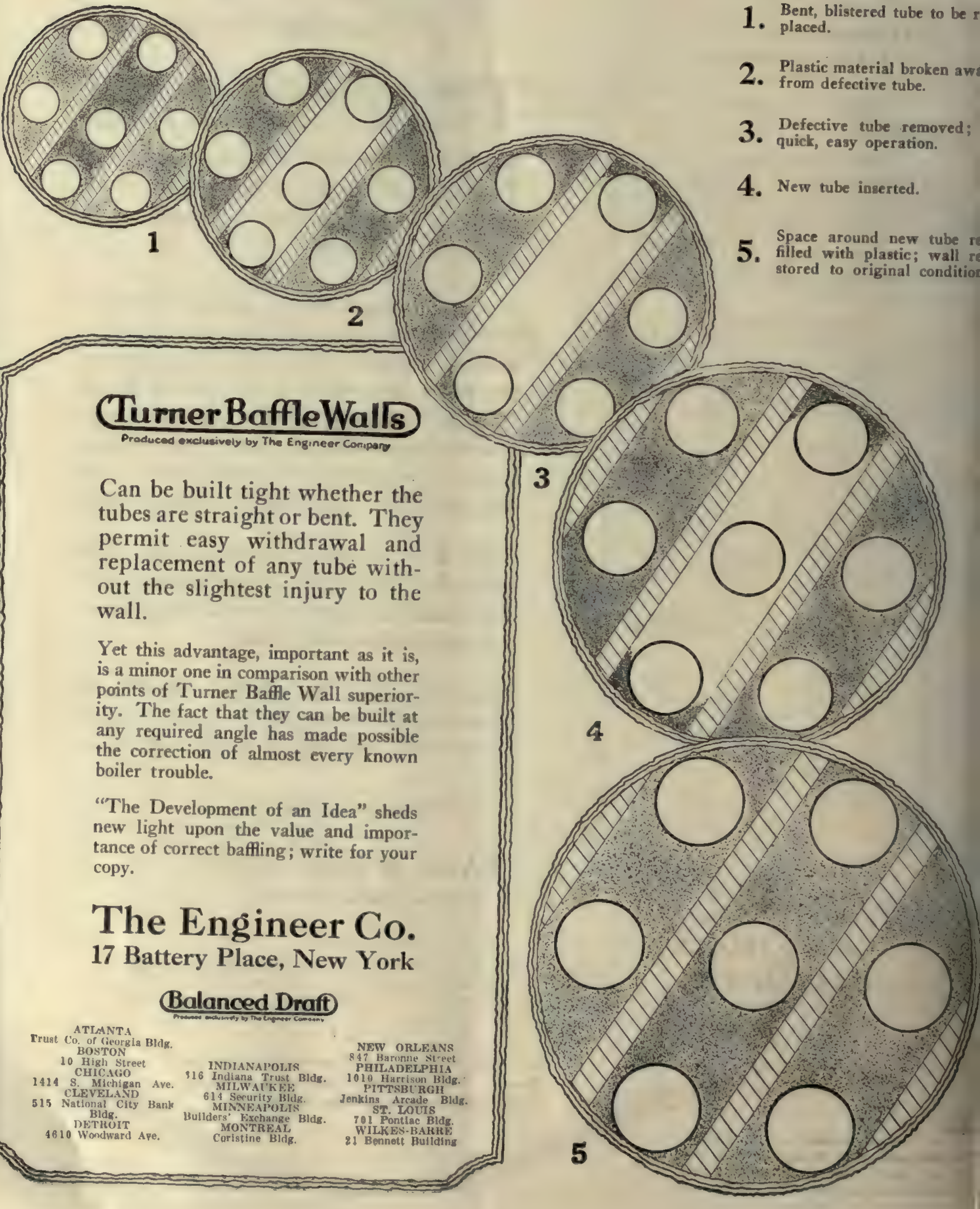
PAGE & HILL CO.
Minneapolis, Minn.

BRANCH OFFICES:

Times Bldg., NEW YORK, N. Y.
717 Bryant Bldg., KANSAS CITY, MO.
19 So. LaSalle, CHICAGO, ILL.
1111 Carter Bldg., HOUSTON, TEXAS
311 Sumpter Bldg., DALLAS, TEXAS
1416 Starks Bldg., LOUISVILLE, KY.

Originators of the P & H Guaranteed Penetration Process. Producers, manufacturers, and foremost in the Butt-Treatment of Cedar Poles.

No Need to Wreck the Baffl Just to Replace a Tube



1. Bent, blistered tube to be r
placed.

2. Plastic material broken aw
from defective tube.

3. Defective tube removed;
quick, easy operation.

4. New tube inserted.

5. Space around new tube r
filled with plastic; wall r
stored to original conditio

Turner Baffle Walls

Produced exclusively by The Engineer Company

Can be built tight whether the tubes are straight or bent. They permit easy withdrawal and replacement of any tube without the slightest injury to the wall.

Yet this advantage, important as it is, is a minor one in comparison with other points of Turner Baffle Wall superiority. The fact that they can be built at any required angle has made possible the correction of almost every known boiler trouble.

"The Development of an Idea" sheds new light upon the value and importance of correct baffling; write for your copy.

The Engineer Co.

17 Battery Place, New York

Balanced Draft

Produced exclusively by The Engineer Company

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Trust Co. of Georgia Bldg.
BOSTON
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CHICAGO
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CLEVELAND
515 National City Bank Bldg.
DETROIT
4610 Woodward Ave.

INDIANAPOLIS
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MILWAUKEE
614 Security Bldg.
MINNEAPOLIS
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ST. LOUIS
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WILKES-BARRE
21 Bennett Building

"Tool Steel" Quality **T. S. Q.** "Tool Steel" Quality

White paint illustrates softened end of teeth on motor side of pinion. This eliminates chipping. (Patent pending)

Remember

"Tool Steel" = Quality
guaranteed and proven
in

SPUR and **HELICAL**
gears and pinions.

"Tool Steel" Helical gears—in sets, or interchangeable with other makes.

"Tool Steel" Quality **T. S. Q.** "Tool Steel" Quality

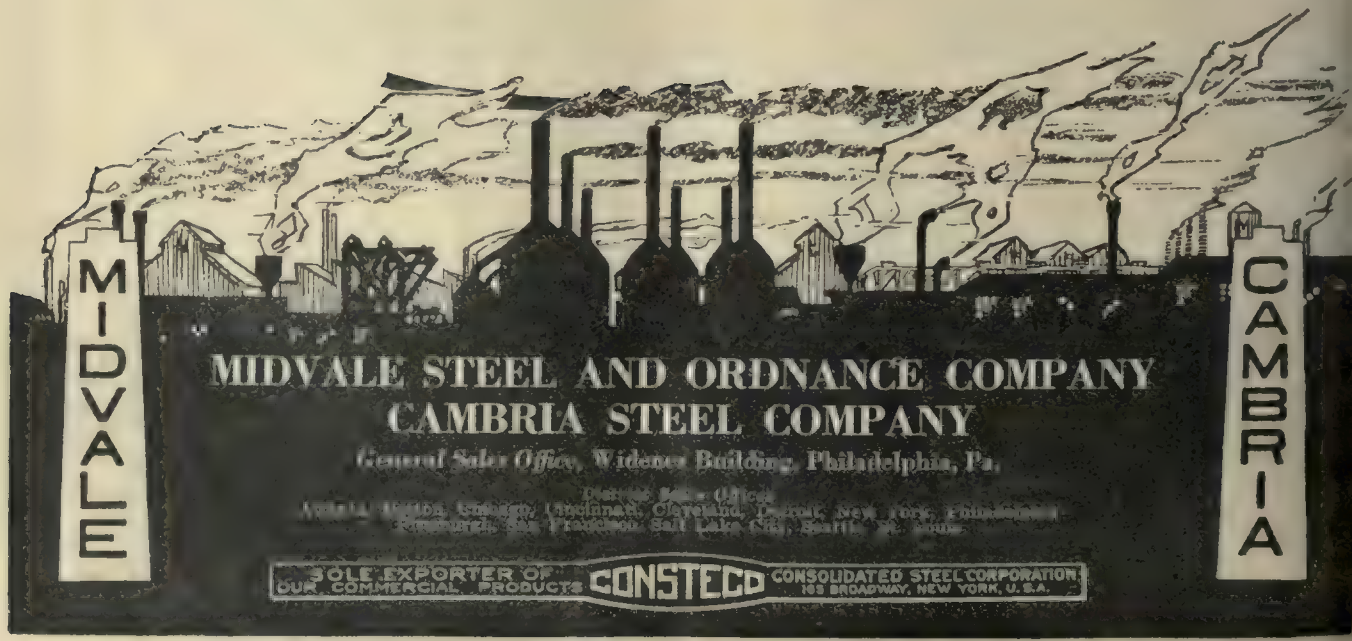
GEAR BLANKS

for ELECTRIC RAILWAY SERVICE

GEARS made from blanks produced by our combined rolling and hydraulic forging process stand up under the most severe operating conditions and are economical to buy and use. That is why they appeal to the operating man.

These blanks appeal to the manufacturer because they are free from blow holes, shrinkage cavities and strains; scrap losses are eliminated; the steel is unusually thoroughly worked; blanks are stronger and more easily machined. There are many other reasons as well.

It will pay to investigate



MIDVALE STEEL AND ORDNANCE COMPANY
CAMBRIA STEEL COMPANY
General Sales Office, Widener Building, Philadelphia, Pa.
District Sales Offices
Atlanta, Boston, Chicago, Cincinnati, Cleveland, Detroit, New York, Philadelphia,
Pittsburgh, San Francisco, Salt Lake City, Seattle, St. Louis

SOLE EXPORTER OF OUR COMMERCIAL PRODUCTS CONSTECO CONSOLIDATED STEEL CORPORATION 165 BROADWAY, NEW YORK, U.S.A.

Nuttall

The Latest Nuttall Development in Railway Motor Pinions

The R. D. Nuttall Company has recently completed a special process of drop-forging motor-pinion blanks.

Pinion blanks made by this new process are homogeneous, close-grained, free from forging flow lines, and possess practically the same longitudinal and transverse strengths.

The real significance of this new development in the basic material, is the production of motor pinions with greater tooth strength in the direction of the loading—that is, transverse or at right angle to the axis.

Below is given data showing the ratios of ductility (taken from transverse and longitudinal tests of normal medium carbon, untreated material) of those types of blanks commonly used (Figs. 1 and 2), and of the Nuttall Special Drop-Forged Blank (Fig. 3).

Fig. 1

Blank Cut from Rolled Steel Bar

	Elongation in 2 inches	Ratio of the elongation of the longitudinal to the transverse
Longitudinal	17.50%	
Transverse	7.50%	42.8%

Fig. 2

Blank Made of Upset Forging

	Elongation in 2 inches	Ratio of the elongation longitudinal to the transverse
Longitudinal	25.00%	
Transverse	15.50%	62.0%

Blank Made of Nuttall Special Drop Forging

	Elongation in 2 inches	Ratio of the elongation of the longitudinal to the transverse
Longitudinal	27.30%	
Transverse	26.60%	97.4%

Fig. 3

Look for our advertisement on Nuttall Special Drop-Forged Pinion Blanks in the next issue of Electric Railway Journal

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

"STANDARD"

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

O. H. Steel and Malleable Iron Castings

Solid Forged Gear Blanks

Steel Forgings Iron Forgings

Forged and Rolled Steel

Pipe Flanges

Ring Dies

Rings

Roll Shells Steel Springs

"The 'Standard' Brand on your material is an assurance of eventual economy."

STANDARD STEEL WORKS CO.

GENERAL OFFICES:

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LONDON, ENGLAND
PARIS, FRANCE

THE U-RE-LITE

A modern Circuit Breaker to meet modern conditions. An I-T-E Circuit Breaker in a steel box: so much better than a fused switch that it is in a class by itself.

It opens instantly on the occurrence of a short circuit or a predetermined overload and can be as instantly reset, but it cannot be closed if the overload continues on the line.

IT DOES AWAY WITH THE CONSTANT EXPENSE AND THE DAMNABLE ANNOYANCE DUE TO THE USE OF FUSES, FOR THE CRY "FUSE BLOWN" MEANS IDLE MEN. It greatly diminishes the possibility of fire from electrical causes and affords positive protection to employees as well as to light or power circuits.

Made in capacities of 60 amperes and under for D.C. circuits of 250 volts or less and A.C. circuits of 250 volts or less, single phase.

Each pole is closed by a slight turn of the handle, which is seen projecting above and below the tripping knob, by means of which the U-RE-LITE may be opened manually.

First to the left,
Then to the right,
Turn the handle
And U-RE-LITE.

LITERATURE UPON REQUEST

The Cutter Company
PHILADELPHIA

Bates One-piece Poles Are Artistic

Perhaps Art is a secondary consideration when you plan your pole line construction, but it cannot be disregarded—especially when these poles are to be installed in exclusive residential districts or on your business blocks.

The combination of great utility and art with the lowest first cost makes the Bates Poles desirable for all types of pole line construction.

Our New 1921 TREATISE AND HANDBOOK sent upon request.

Bates Expanded Steel Truss Co.
208 South La Salle Street
CHICAGO, ILLINOIS

Arms of mate Thermit-welded into place. Mate replaced a previous mate, the rail ends of which had been worn out by electrolysis. Surface of welds shown not yet ground smooth.

No more electrolysis or joint troubles for this mate!

By means of the fully welded Thermit Insert Weld rails can be made continuous with the joint just as strong, smooth and long-lived as the rail itself.

Let us send you an expert at once to instruct your men in this maintenance-reducing form of track construction.

Send for Pamphlet 3932.

METAL & THERMIT CORPORATION

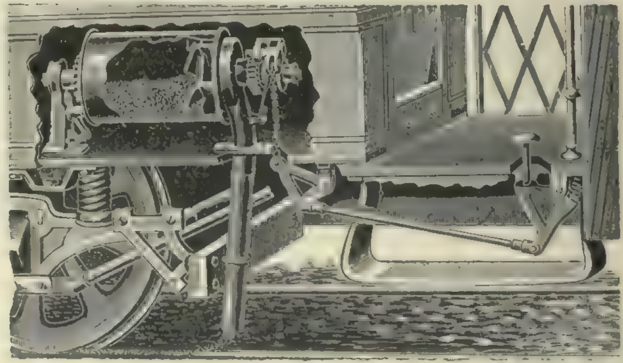
Boston
Chicago
Pittsburgh

120 Broadway New York

SERVICE STRENGTH ECONOMY THERMIT WELDING

Toronto
San Francisco

The "Slippery Iron" is a permanent curse



In the winter it's ice and snow. In the spring and summer it's rain, and in the fall it's leaves. As the cause cannot be remedied the condition itself must be combatted. Sand has proven itself the most effective weapon against slippery rails in all seasons but in emergencies sanding devices often fall down, due to packing of the sand or faulty operation.

The motorman does not have to depend on air where the Sprague Rotary Track Sander is installed. Neither does he have to worry about the condition of the sand, for when his foot presses the plunger the sand drum revolves and agitates the sand, making free delivery always available.

Install them now.

ALBERT & J. M. ANDERSON MANUFACTURING CO.

289-293 A STREET, BOSTON, MASS., U. S. A.

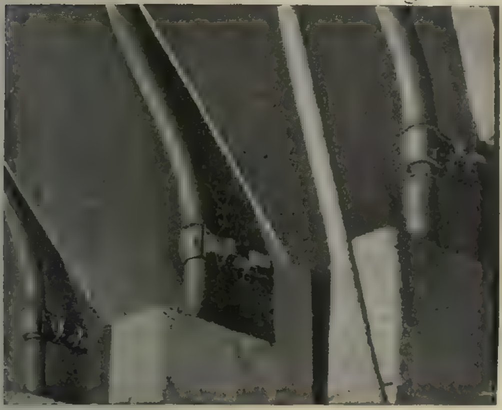
NEW YORK
135 Broadway

PHILADELPHIA: 429 Real Estate Trust Bldg.
LONDON, E. C.: 191-193 Tottenham Court Road

CHICAGO
105 So. Dearborn St.

AETNA

DOSSERT CONNECTORS



From the Giant Power Plant to the Little Safety Car

The picture on the left was taken in the Great Falls plant of the Montana Power Company. It shows Dossert Connectors used for making taps in bus bar compartments. This plant furnishes the power for the great C., M. & St. P. electrification.

The other photo shows a Dossert 3-way Connector installed on a Safety Car of the Third Avenue Railway, New York.

No matter what service, great or small, there is a Dossert Connector that will do the work more easily, more quickly and for less money—and will give better connections.

DOSSERT & COMPANY
242 West 41st Street, New York

SPECIALIZATION is the Keynote of success. Eureka products are the work of specialists.

When you are in need of Trolley Wheels, Commutators, Brush Holders, Bearings, Bushings, Forgings, Castings or any line material, etc., be sure you order Eureka and Eureka products will prove their ability and durability.

North East, Pa.

The Eureka Co.

New York, 120 Broadway

Mr. General Manager:—
Safety Car prices are lower. Do not delay improving your property. Order your Safeties now and watch your earnings increase and public sentiment improve.
Send us your inquiry

St. Louis Car Company
St. Louis, Mo.
"The Birthplace of the Safety Car"

Order By Name

See that "White" is on the end of every porcelain insulator you buy.

"White" reputation has encouraged substitution. You can't risk having a brittle, porous, unreliable insulator that has no mechanical or dielectric strength, worked off on you.

"White" quality goes with the name on the end.

Safeguard line interests by refusing any other "just as good" insulator.

T. C. WHITE ELECTRICAL SUPPLY CO.
1122 PINE STREET, ST. LOUIS, MO.

BERWICK
ELECTRIC
RIVET HEATER

No. 3 Two-electrode Heater, with Hood. For ⅝ in to 1 in. rivets, up to 4½ in. long or longer. Capacity about 300 hot rivets per hour.

Be among the first

to profit by this new method of heating rivets

You will be in good company, for among the purchasers of the first few hundred Berwick Heaters are such concerns as:

The American Locomotive Co........20 heaters
National Steel Car Co................23 heaters
Hydraulic Pressed Steel Co..........15 heaters
Virginia Bridge & Iron Co..........11 heaters
Pressed Steel Car Co................26 heaters
Brown Hoisting Machinery Co........10 heaters
Brooklyn Navy Yard..................21 heaters
Bethlehem Steel Co...................12 heaters
International Motors Co............. 5 heaters
Magor Car Co..........................10 heaters

Many users first installed one or two Berwicks to try them out and then purchased enough to equip their shops complete. As many as three repeat orders have been received from the same concern.

American Car and Foundry Company
Chicago **165 Broadway, New York** **St. Louis**

53

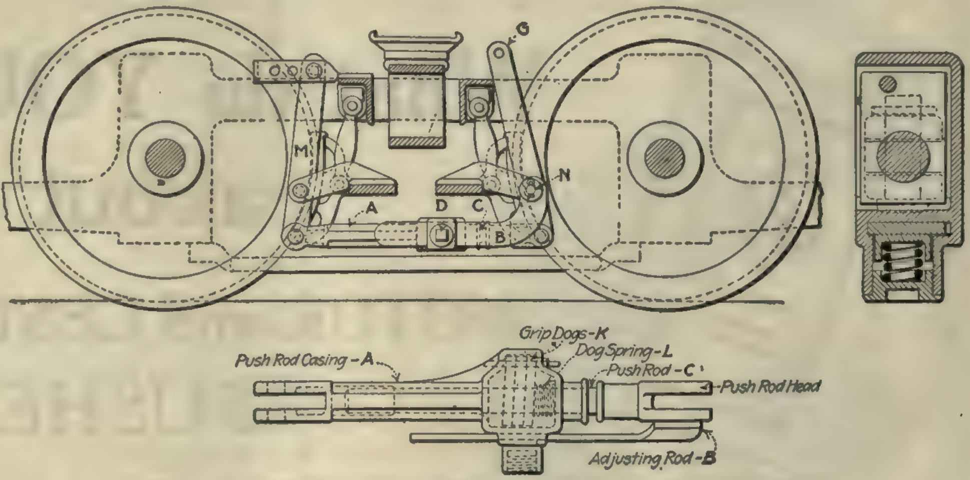
For increased safety in operation—

less wear on rolling stock—

and decreased running time

GOULD

Automatic Slack Adjusters



Details of the Gould Type Slack Adjuster as applied to an Electric Car Truck

Brakes, to be effective, must always be in adjustment. But there has always been the difficulty of getting the proper attention paid to the work of manually adjusting the foundation brake rigging, while slack brake rigging is not always considered sufficient reason for sending a car over the inspection pits.

The Gould Universal Automatic Slack Adjuster overcomes just this objection. It is absolutely automatic in action, taking up all the false slack which may exist in one operation coincident with the application of brakes.

It operates with every application of brakes. It is capable of making the most minute adjustments. The result of its use is that the brakes are kept adjusted at all times—not simply for the first few days as after ordinary hand adjustment. The results are more mileage from your brake shoes, increased life of the entire brake system and decreased liability for breakages in any part.

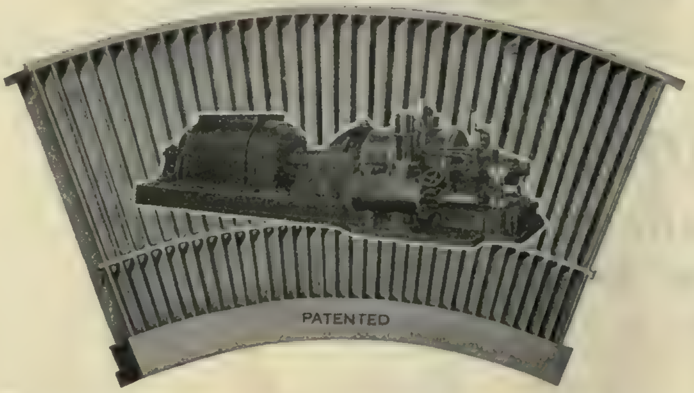
Many railways have adopted the Gould Automatic Slack Adjuster as standard equipment. The Gould Universal Automatic Slack Adjuster is particularly adapted to the one-man safety car. Many installations on this type of car are now in operation, and orders for hundreds of Slack Adjusters have recently been received for one-man cars now being built.

Write today for further information

30 East 42 St., New York City **GOULD COUPLER COMPANY** **The Rookery, Chicago, Ill.**
Works: Depew, N. Y.

Allis-Chalmers Steam Turbines

Have Rugged Blading, True to Design



In the design of Steam Turbines the shape, angle, spacing and fastening of the blades is of first importance in attaining highest efficiency and durability.

The attainment in actual practice of the results contemplated in the design depends upon a blading construction that conforms absolutely to the design in every respect.

Allis-Chalmers Blading is made up in segments of the whole blade ring and the angle and spacing both at the root and at the tip of the blades are fixed by mechanical means with accuracy which cannot be attained by any other method of blade assembling and insures strength and durability.

Send for Bulletin 1104-F

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

What do YOU *know* about

MOTOR and GENERATOR BRUSHES

Write for our Brush Catalog No. B-2

*It is full of valuable information
to any electrical engineer.*

U.S.G. Co's MEXICAN GRAPHITE PRODUCTS EST. 1891

The United States Graphite Co.

Saginaw, Michigan, U. S. A.

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1921

Branch Offices:	New York Chicago	Philadelphia St. Louis	Pittsburgh Denver	Minneapolis San Francisco

LARGEST MINERS OF GRAPHITE ON THIS CONTINENT

To Railway Operators

Carnegie Steel Company manufactures for railway use the most complete line of steel sections made in the United States: rails, cross-ties, bridge material, steel sheet piling, wheels, axles, gear blanks, car materials, slag—in fact, anything and everything within their limits the car-builder, mechanic, or engineer of maintenance of way needs. Furthermore, its trained engineers are ever ready to serve railway executives in the solution of any problem of construction, maintenance or equipment in which wide experience in manufacture can be of assistance. Some lines in which this experience may be of particular value are:

Axles: Carnegie Steel Company makes railway axles standard forged, annealed, or quenched-and-tempered. More than fifty years ago these were considered the best obtainable. They are still the standard of excellence.

Wheels: Carnegie wheels are made to withstand the most severe service. Improvements have been made in machinery and processes of manufacture to assure the utmost in service.

Cross-Ties: Steel cross-ties are the recognized standard for permanent track construction. A trial will demonstrate their economy.

Gear Blanks: The use of gears cut from Carnegie Steel Gear Blanks is a guarantee of maximum service and minimum repairs and installations of new gears.

Slag: For use in any type of concrete construction, or as ballast for roadbed, Blast Furnace Slag is the lightest and strongest coarse aggregate commercially available, and, added to this, within haulage radius from furnaces, it is the most economical.

For literature on any one or all of these specialties write any district office.

Carnegie Steel Company

General Offices: Carnegie Building, Pittsburgh, Pa.

1422

Cut Your Maintenance Costs By Using

Triggerlock Reversible Controller Fingers

Over 50% of the large traction systems of America have used them exclusively for years.

Our sales of Renewal Tips last year were three times as much as in 1919.

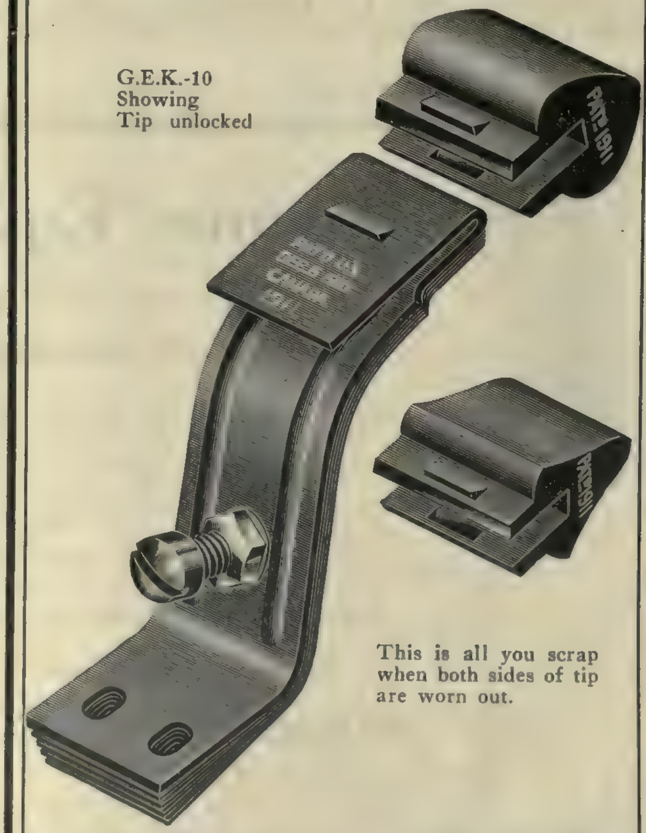
By renewing the tips after both sides have been worn down the cost of complete fingers is saved.

This with the time and labor required to attach and adjust new fingers is great economy.

The motormen like them, as the controller is easier to operate.

We have Triggerlock Fingers for all types of controllers, trucks, tractors, starters, compensators, etc.

Specify them on your next requisition



G.E.K.-10
Showing
Tip unlocked

This is all you scrap
when both sides of tip
are worn out.

RUSSELL MFG. CO.

814-18 Bath Avenue, Niagara Falls, N. Y.
557 King Street, (West) Toronto, Canada

Chillingworth One Piece Gear Case

40% Lighter and More Durable than Malleable Iron Cases

Chillingworth End Supported Gear Case

Weight 50 pounds for Safety Car Motor

CHILLINGWORTH MANUFACTURING CO.
JERSEY CITY, N. J.

Bayonet Equipment

The Friend of High Speed Schedules

10 Seconds

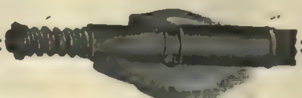
It is those quick repairs on the road—not in the leisure routine of the shop—which determine the reputation of your cars to live up to their schedule.

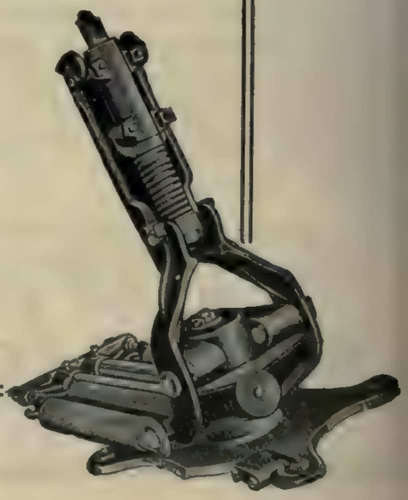
Bayonet Trolley Harps and Wheels can be changed in 10 seconds without tools. A pole fitted to a Bayonet Base can be changed in one minute by use of Bayonet clamps.

Rugged, perfectly fashioned and serviceable, this detachable feature impairs their durability in no way.

Sold on 60 Day's Approval. Write for details

BAYONET TROLLEY HARP COMPANY
Springfield, Ohio, U. S. A.





Better than fiction—

It's the true life story of an electric railway man.

There's a thrill on every page.

He lands the job

In 1895, I found myself out of a job, with a wife and child to support. Times were very hard and work scarce. Riding past the office of the Seaboard Railroad Co., I saw a number of men standing around, and asked the conductor what they were there for. When he told me they were after jobs, I dropped off the car and asked for one too.

His first step

About this time the Amalgamated got hold of the Seaboard Company and things changed for the worse. Almost every day an inspector would get on my car and after talking about the weather, borrow a quarter for a drink. This quarter I was free to forget to register, to get even, but I decided that where things were run on such a basis I had no chance to get ahead. In fact, I decided "pull" was the only road to promotion.

At the meeting

I got up and asked the Electrical Engineer, "If a car is running away down hill with the plow springs torn off, leaving the car without power from the line, the brake chain broken, would the motors generate electric pressure and could this be used to stop the car?"

I thought he would say "Yes," and expected to go on asking questions until he explained how and why this was so.

To my surprise, however, he answered "No" in a most emphatic way. This gave me quite a shock as I knew he was wrong, but I did not dare say so.

Made starter—than head starter

Soon after this the Superintendent called me in and told me he was going to promote me to starter.

What happened in the power house

One night, he gave me a particularly dirty job, and afterwards came to where I was working and in a sarcastic manner asked, "Pretty dirty job, young fellow?" "Yes, sir," I replied, "but it isn't the only dirty thing around here," and kept on the job, whistling.

I saw I had hit him pretty hard. Finally he said he guessed I was right, and told me to quit that job, and come over on the high tension job with him.

Becomes General Superintendent

After a two-hour examination he told me he needed a man of my calibre as superintendent. As a result, I was appointed General Superintendent of the company.

The above are a few paragraphs from the booklet, "How I Made Good in the Electric Railway Field"—a booklet every man in the electric railway industry ought to read—a booklet every red-blooded fellow will enjoy, especially the men in the shops. It's chock full of human interest and when you finish the last page you'll say, "Who says there's no romance in the electric railway game?"

Drop us a line for your copy of "How I Made Good in the Electric Railway Field"—it's free.

Electric Railway Journal
Tenth Ave. at 36th St., New York, N. Y.

For Long Spans and Heavy Loads

In the railroad shop where heavy duty is paramount the right crane is essential.

NILES CRANES

For years have proven their ability to stand up under all conditions of service

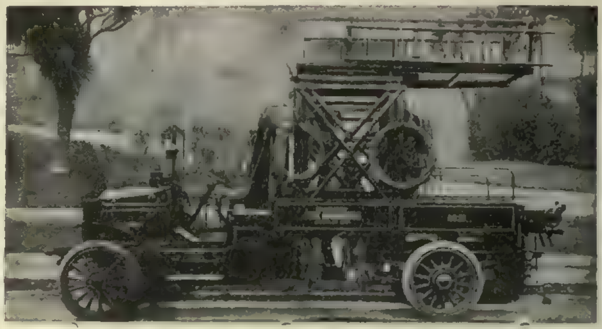
Where the building construction is such that the standard design will not be practical we can design and build a crane to fit the job.

Accessible bearings are thoroughly oiled, thus reducing wear to a minimum and assuring long life. Cables are prevented from twisting, which eliminates undue strain and stresses.

All of these points and many more make possible the low maintenance cost of Niles Cranes.

Standard size up to 250 Tons and Larger.
Variations in design to suit conditions
on consultation with our Engineers.

Niles-Bement-Pond Co.
111 Broadway, New York



TRUCK WITH TOWER IN RUNNING POSITION

This 3-Section
TRENTON TOWER

is not only more convenient, but stronger than the older type.

The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

We'll gladly send you details.

J. R. McCARDELL CO.
Trenton, New Jersey, U. S. A.

USEFUL
ELECTRICIANS' KNIFE

PRESSING TOP OF LARGE BLADE UNLOCKS SCREW-DRIVER BLADE
XELA
XELA

A handy combination for the electrician, combining an emergency screw driver, a knife blade for cutting or stripping wire; locked so that it cannot close during use. The commendable features are a well-tempered blade, a strong joint, a solid well-proportioned hand-fitting handle and a lock to keep the blade securely open, yet promptly releasable when it is desired to close the blades. Screw driver blade is locked when open; to unlock, press down on large blade.

Mathias Klein & Sons
Canal Station 25, Chicago

Peirce Forged Steel Pins with Drawn Separable Thimbles

Your best insurance against insulator breakage

Hubbard & Company
PITTSBURGH, PA.

Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

ARCHBOLD-BRADY CO.
Engineers and Contractors **SYRACUSE, N. Y.**

Wire Rope and Wire
Electrical WIRES and CABLES

JOHN A. ROEBLING'S SONS COMPANY, Trenton, N. J.

Chapman
Automatic Signals

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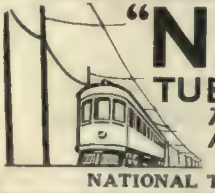

"NATIONAL"
TUBULAR STEEL POLES

The Recognized Standard For Electric Railway Purposes

Ask for "NATIONAL" Bulletin No. 14

NATIONAL TUBE COMPANY, PITTSBURGH, PA.

COPPER CLAD STEEL COMPANY

COPPERWELD

OFFICE AND WORKS.
RANKIN, PA. BRADDOCK P. O.

WESTERN SALES REPRESENTATIVES
STEEL SALES CORPORATION, CHICAGO, ILL.

NEW YORK SALES OFFICE: 30 CHURCH STREET, NEW YORK CITY

COPPERWELD Wire—a non-corroding electrical conductor 8% Lighter—50% Stronger than Copper.

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Specialists in Street Railway Requirements

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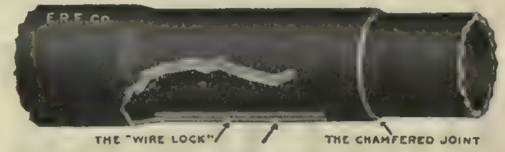

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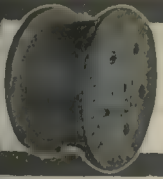

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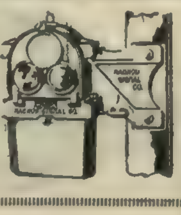

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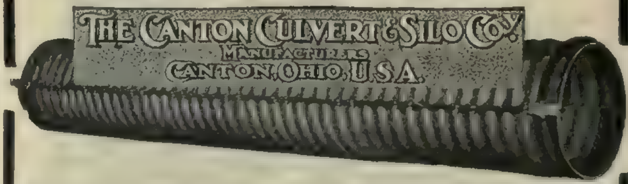

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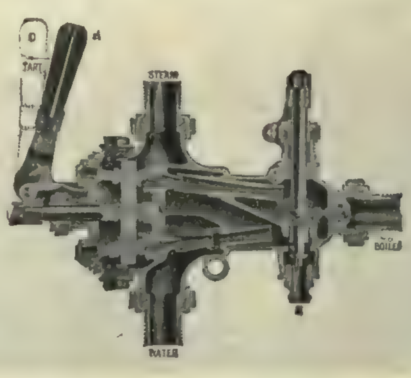

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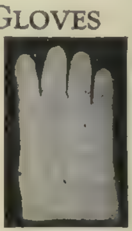
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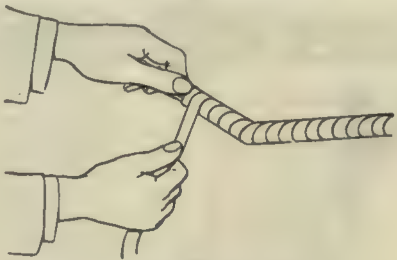
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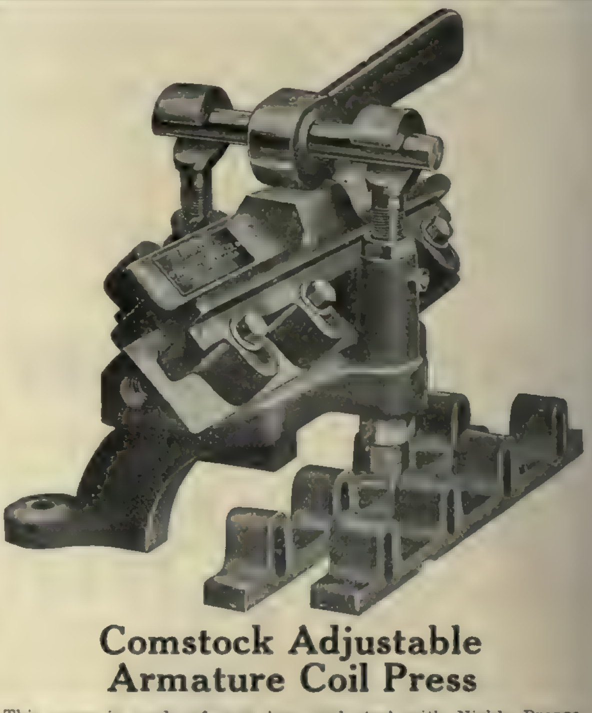

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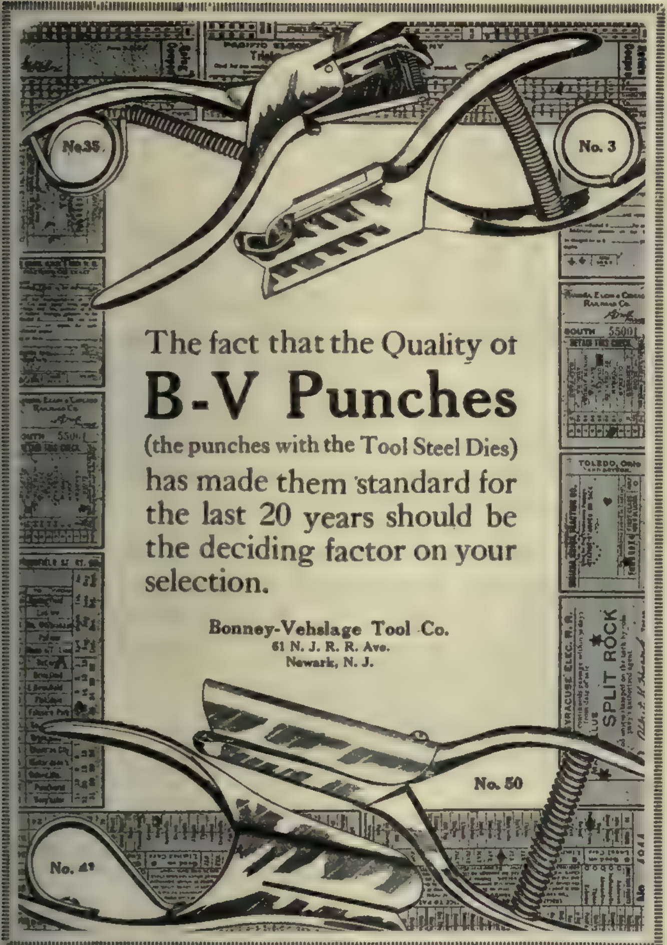

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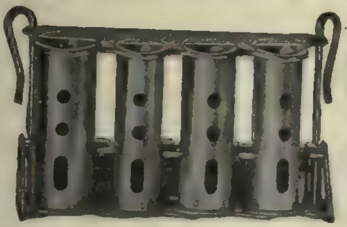

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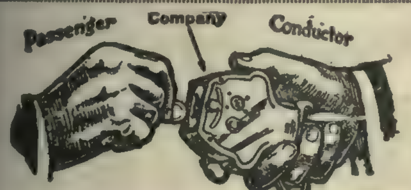

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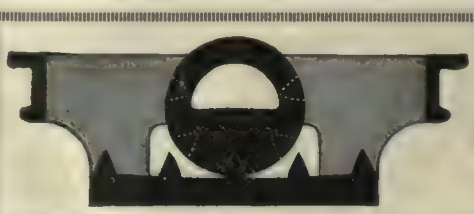

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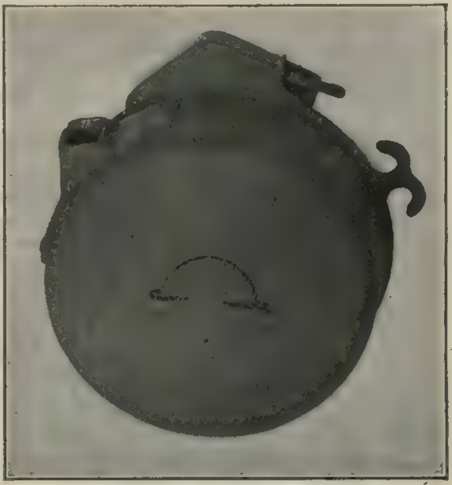

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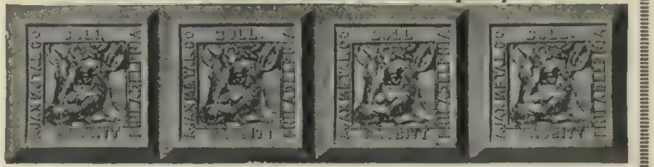

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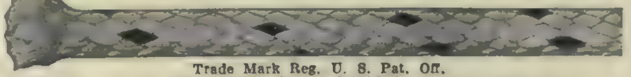

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GENERAL foreman and paving foreman on paved city track construction; location Central New York. P-874, Elec. Ry. Journal.

POSITIONS WANTED

AMUSEMENT park manager at liberty will operate park for owners on salary and commission basis, or will lease park outright upon terms mutually satisfactory. Many years' experience. electric railway references. Address, Park Manager, Room 403, 1511 Arch Street, Philadelphia, Pa.

ELECTRICAL engineer, technical graduate; four years' experience in testing and railway engineering departments of large electrical manufacturer. Position wanted with electic railway company where duties will concern electrical equipment of both power house and rolling stock; age 29; minimum salary $250 per month; available after 30 days' notice to present employer. PW-873, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

EXPERIENCED outside construction man desires position in way of electric railway, lighting, underground and submarine cables. Most experience in city of 200,000 population. Can produce results. PW-828, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

FREIGHT manager: Young man with proven exeuctive ability, 11 years of sound business experience and thoroughly familiar with trolley freight problems. Will consider a change of position. Now employed as chief clerk of freight service in large Eastern street railway corporation. PW-876, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

MANAGER or superintendent. Age 37, height 5 ft. 8 in.; seventeen years' experience in all branches of tramway work with one up-to-date corporation, as conductor, motorman, inspector, and motor inspector. As motor inspector I was responsible for the motormen and their efficiency, power economy, rolling stock, etc. In two years I reduced the power bill by £4,000 ($20,000) per year; increased the wheel tire mileage 15,000 miles; brake blocks 12,000 miles; reduced accidents and insurance premium; power consumption for B. T. H. four motored cars, was the lowest in the British Isles; almost the lowest any make of tramcar. Competent to take charge of maintenance; overhead and permanent way departments; office routine as correspondence, costing, filing, legal procedures, returns and analysis. Conversant with the revenue side and alert to stop "leakages"; I have organized working and bonus systems approved of by the highest authorities on tramways and trade unionism. Capable of dealing with labor troubles. My present post in the tropics gives me experience with a colored public and labor. Further particulars, copies of references, and photograph if required. PW-871, Elec. Ry. Journal.

MECHANICAL engineer, age 39, graduated Poly technical school Zurich, Switzerland, 17 years' experience construction of locomotives, but last 10 years in chemical works employed for supervision of construction and erection of plants, designing apparatus, tests proposing efficiency and improvement matters; experienced organizer; perfect knowledge of English, French, German, some Italian; highest references. PW-878, Elec. Ry. Journal.

SUPERINTENDENT of transportation, desires a change, will consider any city or suburban property that requires a man of broad experience in this line; age 40, clean, progressive, nearly 18 years' experience on large city and suburban properties. successful in dealing with public and labor, having a proven record as a transportation man who knows how to get results. Would prefer property that needs building up. Best of references. PW-867, Elec. Ry. Journal., Old Colony Bldg., Cleveland.

WORK WANTED

Work Wanted for Trucks

Special track work only; examinations, reports, estimates, surveys, plans, specifications, purchasing and supervision; first-class work only, solicited by expert. WW-877, Elec. Ry. Journal, Leader-News Bldg., Cleveland.

Wanted:—Wheel Press

Second hand, first class condition, hydraulic 100 to 125 tons, for 36 in. wheels on standard or less track gauge. Address

GREAT LAKES COAL MINING CO.
Columbus, Ohio

FOR SALE
Eight G. E.
DYNAMOTORS
first-class condition. Car type 1200-600 V. 15 Amps.
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1—4 Motor G. N. 55 Equipment with Type M Control, Complete, (Except Gears)	6000.00
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3—A E R A—Standard Type E. C. Axles with 6-37 in. Rolled Steel Wheels, 3½ in. Thread, ⅞ in. Flange	460.00
2—Extra 37 in. Wheels as above	100.00
3—60 Tooth Gears 6-15/16 in. bore, 5⅜ in. face, 2½ pitch, mounted on above axles	120.00
2—Gears as above	80.00
3—Extra 17 Tooth Pinions, 5-⅜ in. face, 2½ pitch	40.00
Total	$10,800.00

For further information write **G. O. SNIDER,** *Purchasing Agent,*
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2—200 kw. G. E. 25 cy. 370 v. A.C., 600 v. D.C., 750 r.p.m.
1—150 kw. Westg. 3 ph. 60 cy. 370 v. A.C., 575 v. D.C., 720 r.p.m.
2—150 kw. G. E. 25 cy., 370 v. A.C.; 600 v. D.C., 750 r.p.m.

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1—500 kw. G. E. 3 ph., 60 cy., 2300 v., 750 r.p.m. generator dir. ctd. to 700 hp., 3 ph., 25 cy., 13200 v., 750 r.p.m. motor.
1—500 kw. G. E. 3 ph. 60 cy. 2300 v. 300 r.p.m. generator dir. ctd. to 800 hp. 3 ph. 25 cy. 2300 v. 300 r.p.m. motor.

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WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Aftercoolers
Ingersoll-Rand Co.

Air Circuit Breakers
Condit Electrical Mfg. Co.
Roller-Smith Co.

Air Receivers
Ingersoll-Rand Co.
Western Elec. Co.

Ammeters
Roller-Smith Co.

Anchors, Guy
Crouse-Hinds Co.
Electric Service Supplies Co.
Ohio Brass Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Angle Bars
Lackawanna Steel Co.

Automobiles and Buses
Brill Co., The J. G.

Axles
Cambria Steel Co.
Carnegie Steel Co.
Bemis Car Truck Co.
Midvale Steel & Ordnance Co.
St. Louis Car Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Standard Steel Works Co.
Westinghouse Elec. & Mfg. Co.

Babbitt Metal
Ajax Metal Co.
More-Jones Brass & Metal Co.

Babbitting Devices
Columbia M. W. & M. I. Co.
Western Elec. Co.

Badges and Buttons
American Railway Supply Co.
Electric Service Supplies Co.
International Register Co., The
Western Elec. Co.

Batteries, Dry
National Carbon Co. Inc.
Nichols Lintern Co.
Western Elec. Co.

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
St. Louis Car Co.
Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.
Western Elec. Co.

Benders, Rail
Niles-Bement-Pond Co.

Boilers
Babcock & Wilcox Co.

Boiler Tubes
National Tube Co.

Bond Testers
American Steel & Wire Co.
Rail Welding & Bonding Co.
Roller-Smith Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.
Rail Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse Elec. & Mfg. Co.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Bores—Junction and Outlet
National Metal Molding Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
Western Elec. Co.

Brake Adjusters
Gould Coupler Co.
National Ry. Appliance Co.
Smith-Ward Brake Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Traction Brake Co.
Western Elec. Co.

Bridges and Buildings
Amer. Bridge Co.

Brooms, Track, Steel or Rattan
Western Elec. Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
National Carbon Co. Inc.
United States Graphite Co.
Westinghouse Elec. & Mfg. Co.

Brushes, Graphite
National Carbon Co., Inc.
United States Graphite Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

Bunkers, Coal
Amer. Bridge Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., J. G.
National Metal Molding Co.

Bushings, Graphite and Wooden
Bound Brook Oilless Bearing Co.

Cables. (See Wires and Cables)

Cambric, Yellow & Black Varnished
American Di-Electric, Ltd.

Cambric Tapes, Yellow & Black Varnished
American Di-Electric, Ltd.

Carbon Brushes. (See Brushes, Carbon)

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
Midvale Steel & Ordnance Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
General Electric Co.

Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

Castings, Gray Iron and Steel
American Bridge Co.
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Earll, Chas. I.
Electric Service Supplies Co.
Ohio Brass Co.
Trolley Supply Co.
Wood Co., Chas. N.

Ceiling, Car
Rail Welding & Bonding Co.

Change Carriers
Galef, J. L.

Checks, Employees
American Railway Supply Co.

Circuit Breakers
Cutter Elec. Mfg. Co.
Don-O-Lac Co.
General Electric Co.
Roller-Smith Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Dossert & Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Hubbard & Co.
Klein & Sons, Mathias
Ohio Brass Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.

Cleats
National Metal Molding Co.
Western Elec. Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Comstock Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Comstock Mfg. Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & Mfg. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Coin-Counting Machines
Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.

Combustion Systems
Engineer Co.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Don-O-Lac Co.
Eureka Co.
General Electric Co.
Mica Insulator Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
Chicago Pneumatic Tool Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Trac. Brake Co.

Compressors, Gas
Ingersoll-Rand Co.

Concrete Products
Massey Concrete Products Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

Conduit Fittings
Crouse-Hinds Co.

Conduits, Flexible
Tubular Woven Fabric Co.

Conduits, Interior
National Metal Molding Co.
Western Elec. Co.

Condulets or Conduit Fittings
Crouse-Hinds Co.

Connectors, Solderless
Dossert & Co.
Frankel Connector Co.
Westinghouse Elec. & Mfg. Co.

Controller Fingers
Russell Mfg. Co.

Controllers or Parts
Columbia M. W. & M. I. Co.
Don-O-Lac Co.
Eureka Co.
General Electric Co.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Conveying and Hoisting Machinery
American Bridge Co.
Columbia M. W. & M. I. Co.

Cooling Systems
Spray Engineering Co.

Copper Wire
Anaconda Copper Mining Co.
Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roebling's Sons Co., John A.
Samson Cordage Works
Silver Lake Co.
Trolley Supply Co.

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Gould Coupler Co.
Ohio Brass Co.
Westinghouse Trac. Brake Co.

Cranes
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.

Cross Arms. (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing Signals. (See Signals, Crossing)

Crossings, Frog & Switch
Wharton, Jr., & Co., Wm.

Crossings, Manganese
Indianapolis Switch & Frog Co.

Crossings, Track. (See Track, Special Work)

Culvert Pipe, Concrete
Massey Concrete Products Co.

Culverts
Armco Iron Culvert & Flume Mfgs.
Canton Culvert & Silo Co.

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Brill Co., The J. G.
Electric Service Supplies Co.
St. Louis Car Co.

Dealer's Machinery
Archer & Baldwin
Electric Equipment Co.
Hyman Michaels Co.

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National Pneumatic Co., Inc.
Safety Car Devices Co.

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General Electric Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc.

Draft Rigging. (See Couplers)

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Niles-Bement-Pond Co.
Ohio Brass Co.

Dryers, Sand
Electric Service Supplies Co.
Zelnicker Supply Co., Inc. Walter A.

Electrically Operated Switches (Air or Oil)
Condit Electrical Mfg. Co.

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American Electrical Works
Roebling's Sons Co., J. A.

Electric Rivet Heaters
Amer. Car & Fdry. Co.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Clark Management Corp., E. W.
Day & Zimmermann, Inc.
Drum & Co., A. L.
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Horton Barker & Wheeler
Jackson, Walter.
Jacobs & Co., J. L.
Republic Engineers, Inc.
Richey, Albert S.
Sanderson & Porter
Stone & Webster
White Engineering Corp., The J.G.

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Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

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Johnson Fare Box Co.
Ohmer Fare Register Co.
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American Steel & Wire Co.
Western Elec. Co.

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Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.
Star Brass Works

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Westinghouse Elec. & Mfg. Co.

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Columbia M. W. & M. I. Co.
Duff Mfg. Co.
Eureka Co.
Standard Steel Works Co.
Williams & Co., J. H.

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Funnel Castings
Wharton, Jr., Inc., & Co., Wm.

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General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.
Williams & Co., J. H.

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Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.

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Ohio Brass Co.

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Westinghouse Traction Brake Co.

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General Electric Co.

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Standard Steel Works Co.

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Electric Service Supplies Co.
Thayer & Co.
Westinghouse Elec. & Mfg. Co.

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Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Gong (See Bells and Gongs)

Greases. (See Lubricants)

Grinders and Grinding Supplies
Metal & Thermit Corp.
Railway Track-work Co.
Western Elec. Co.

Grinding Blocks and Wheels
Railway Track-work Co.

Guards, Cattle
Amer. Bridge Co.

Guards, Trolley
Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley
Anderson Mfg. Co., A. & J. M.
Bayonet Trolley Harp Co.
Electric Service Supplies Co.
Hensley Trolley & Mfg. Co.
Nuttall Co., R. D.
Star Brass Works
Western Elec. Co.

Headlights
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.
Trolley Supply Co.

Heaters, Car (Electric)
Consolidated Car Heating Co.
Economy Electric Devices Co.
Gold Car Heating & Lighting Co.
National Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Cooper Heater Co.
Smith Heater Co., Peter

Heaters, Car (Stove)
Electric Service Supplies Co.
Smith Heater Co., Peter

Heaters, Electric Rivet
Amer. Car & Foundry Co.

Hoists and Lifts
Chicago Pneumatic Tool Co.
Columbia M. W. & M. I. Co.
Ford Chain Block Co.
Niles-Bement-Pond Co.
Toledo Bridge & Crane Co., The

Hose
Ingersoll-Rand Co.

Hose, Bridges
Ohio Brass Co.

Houses, Station, Watchmen's, Concrete
Massey Concrete Products Corp.

Hydraulic Machinery
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.

Injectors
Schutte & Koerting Co.

Instruments, Measuring, Testing and Recording
General Electric Co.
Roller-Smith Co.
Thompson-Levering Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Insulating Cloth, Paper and Tape
American Di-Electric, Ltd.
General Electric Co.
Mica Insulator Co.
Sherwin-Williams Co.
Westinghouse Elec. & Mfg. Co.

Insulating Material, China and Porcelain
Jeffrey DeWitt Insulator Co.

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American Di-Electric, Ltd.

Insulation. (See also Paints)
American Di-Electric, Ltd.
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Electric Service Supplies Co.
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Drew Electric & Mfg. Co.
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Rail Joint Co.
Zelnicker Supply Company, Inc., Walter A.

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Brill Co., J. G.
Railway Roller Bearing Co.

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General Electric Co.
National Electric Specialty Co.
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General Electric Co.
National Electric Specialty Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

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Nichols-Lintern Co.
Ohio Brass Co.

Lathe Attachments
Williams & Co., J. H.

Lathes, Car Wheel
McCabie Lathe & Machinery Corp., J. J.
Niles-Bement-Pond Co.
Western Elec. Co.

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Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Line Material. (See also Brackets, Insulators, Wires, etc.)
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Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Dossert & Co.
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Electric Service Supplies Co.
Eureka Co.
General Electric Co.
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Western Elec. Co.
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Galena-Signal Oil Co.
Universal Lubricating Co.

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Galena-Signal Oil Co.
Universal Lubricating Co.

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Columbia M. W. & M. I. Co.
Niles-Bement-Pond Co.

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Columbia M. W. & M. I. Co.

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American Insulating Machine Co.

Manganese Steel Castings
Wharton, Jr., & Co., Wm.

Manganese Steel Special Track Work
Wharton, Jr., & Co., Wm.

Meters (See Instruments)
Electric Service Supplies Co.
Roller-Smith Co.

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Mica Insulator Co.

Motor Leads
Dossert & Co.

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Allis-Chalmers Mfg. Co.
Brill Co., J. G.
Electric Service Supplies Co.
Wood Co., Chas. N.

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Welte & Son Inc., M.

Oxy-Acetylene (See Cutting Apparatus Oxy.)

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Dolph Co., John C.
Mica Insulator Co.
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Power Specialty Co.
Standard Steel Works Co.
Westinghouse Traction Brake Co.

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Electric Service Supplies Co.

Plugs
National Metal Molding Co.

Babson's report of April 12th says:

"Business will be called 'quiet,' but in many lines there should be some improvement. If you have weathered the storm of the past seven months, you can take courage! At this state of depression the main problem is selling. Cut down your production expenses as far as you can, do without further expansion in new buildings and equipment, but don't skimp on your selling appropriations. Now is the time to use that reserve fund which was set aside during the fat years! Later in the depression area we shall come to the point where you should increase your plant, but this summer—increase your advertising! Take the aggressive course. There will be considerable business; the firm which goes after it will be the one to get it!

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Bennett-Field Cross Tie Co.
Duncan Lumber Co.
Massey Concrete Products Corp.
Western Elec. Co.

Pole Reinforcing
Hubbard & Co.

Pole Top Switches
Condit Electrical Mfg. Co.

Poles, Trolley
Anderson Mfg. Co., A. & J. M.
Bayonet Trolley Harp Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
National Tube Co.
Nuttall Co., R. D.

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Electric Railway Equipment Co.
National Tube Co.

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Economy Electric Devices Co.
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Allis-Chalmers Mfg. Co.
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Wood Co., Chas. N.

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Rail Joint Plates
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Rail Steel
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McGuire-Cummings Mfg. Co.
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Electric Service Supplies Co.
International Register Co., The
Rooke Automatic Register Co.

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Condit Electrical Mfg. Co.

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Brill Co., The J. G.

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St. Louis Car Co.

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Wood Co., Chas. N.

Signal Systems, Highway Crossing
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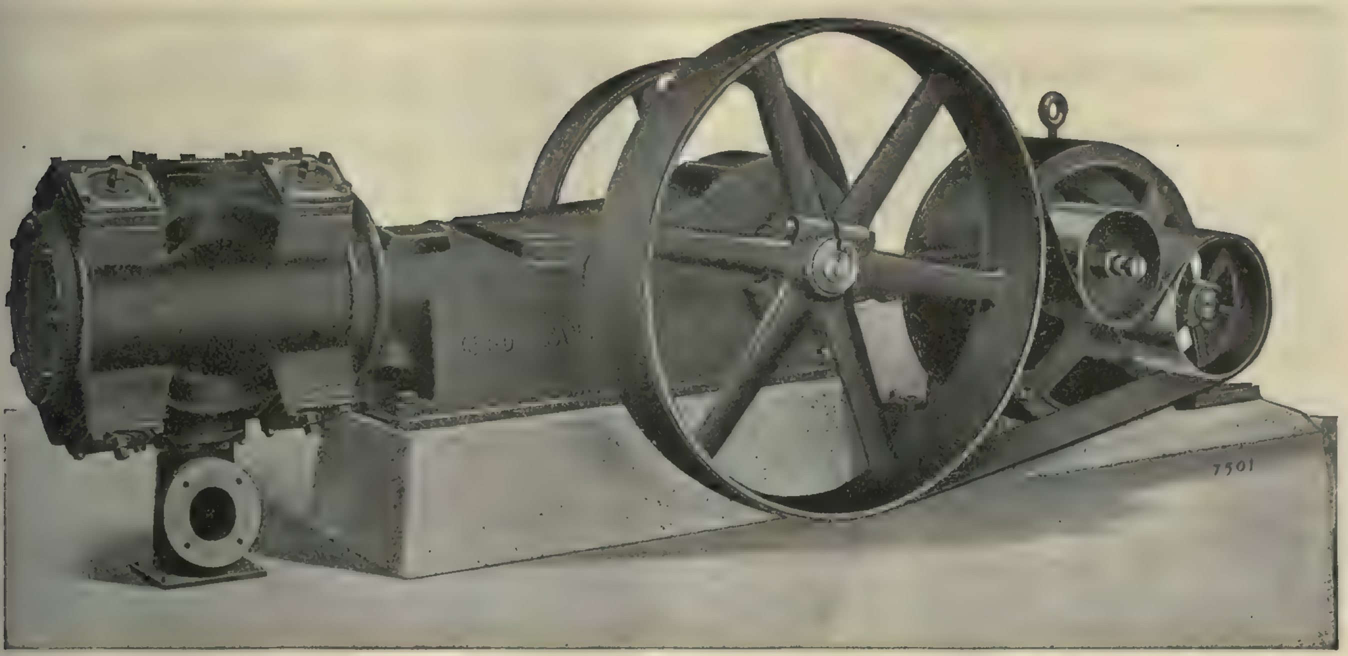

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RAILWAY UTILITY COMPANY
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"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings.
also ELECTRIC THERMOMETER CONTROL
of Car Temperatures.
141-151 WEST 22D ST. Chicago, Ill.
Write for Catalogue
1328 Broadway New York, N. Y.

THE DIFFERENTIAL STEEL CAR CO.
H. Fort Flowers, Pres. & Gen. Mgr.
FINDLAY, OHIO

FERALUN Anti-Slip Treads
Car Steps
Floor Plates
Station Stairs
Door Saddles, etc.
Its Iron and Emery Cast Together
AMERICAN ABRASIVE METALS CO.
50 Church St., New York City

MASON SAFETY TREAD—Lead or carborundum filled; non-slippery, prevents accidents; cuts out damage suits.
KARBOLITH CAR FLOORING—For steel cars; is sanitary, light weight, fire proof, non-slippery.
STANWOOD STEPS—Self-cleaning, non-slippery, light.
Over six million feet used without accident being reported within the knowledge of manufacturer. Our products used on all leading railroads on cars and stations. For details address:
AMERICAN MASON SAFETY TREAD CO., Lowell, Mass
Branch Offices: Boston, New York City, Philadelphia
Agencies in all principal cities
Joseph T. Ryerson & Son, General Western Distributors

PS HEATERS
Car Heating and Ventilation
is one of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.
The Peter Smith Heater Company
1725 Mt. Elliott Ave., Detroit, Mich.

THE SEARCHLIGHT SECTION
will locate the
Man you want
Position you want
Equipment you want
Are you using the Searchlight?
59

Collier Service

Just One Example of What Goes Into Collier Service

It would take a large volume to describe the organization that has made Collier Service synonymous with the best in car-card advertising.

But perhaps a reference to but one sub-department of the Collier Service organization may help to give a conception of the whole.

This is our perpetual inventory of Collier Servic cars whereby we maintain records of scores of thousands of cars, not merely by number, but by location and the names of the advertisers' cards occupying the spaces, the kind of card on display, when each card was installed, when it is to be removed, and so on.

The cost of maintaining this particular means of seeing that every Collier Service advertiser is treated according to contract and that your car-card space is used to bring the utmost in results to all parties in interest runs over $200,000 per year.

Barton G. Collier
INCORPORATED

Candler Building, New York

COLUMBIA EQUIPMENT

For the

Rolling Stock
Car Barn
Repair Shop
Line

Twenty-nine years of experience in putting out practical shop tools, equipment and supplies has brought to this company a wealth of experience that is at your service.

We have in our plant dies, jigs, templates, patterns and equipment for turning out immediately practically all types of electric railway equipment parts that have been in use for the past decade.

At this time we are particularly well fitted to supply the demands of the industry for forgings. We are serving more and more companies each month in the production of equalizer bars and brake rigging. Let us submit figures on your needs.

TOOLS

Armature and axle straighteners
Armature shaft straighteners
Armature buggies and stands
Babbitting molds
Banding and heading machines
Car hoist
Car replacers
Coil taping machines for armature leads
Coil winding machines
Pinion pullers
Pit jacks
Signal or target switches
Tension stands

CAR EQUIPMENT

Armature and axle bearings
Armature and field coils
Bearings (axle and armature)
Brush-holders and brush-holder springs
Brake, door and other handles
Brake forgings, rigging, etc.
Car trimmings
Commutators
Controller handles
Forgings of all kinds
Gear cases (steel or malleable iron)
Grid resistors
Third rail shoe beams and accessories
Trolley poles (steel) and Wheels

The Columbia Machine Works & Malleable Iron Company

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

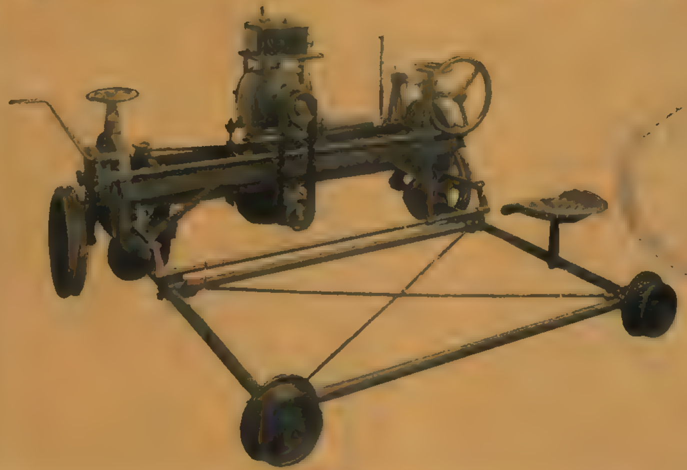
A. A. GREEN, Sales Mgr., 50 Church St., New York City
ERNEST KELLER, FRANK C. HEDLEY, Brooklyn, N. Y.
E. ALLISON THORNWELL, 1026-7 Atlanta Trust Bldg., Atlanta, Ga.
J. L. WHITTAKER, 141 Milk St., Boston, Mass.
F. F. BODLER, 903 Monadnock Bldg., San Francisco, Calif.
W. McK. WHITE, 343 South Dearborn St., Chicago, Ill.

aw-Hill Co., Inc. April 23, 1921 Twenty Cents Per Copy

ELECTRIC RAILWAY JOURNAL

These Grinders are used on roads with seven miles of track and on roads with more than a thousand miles of track

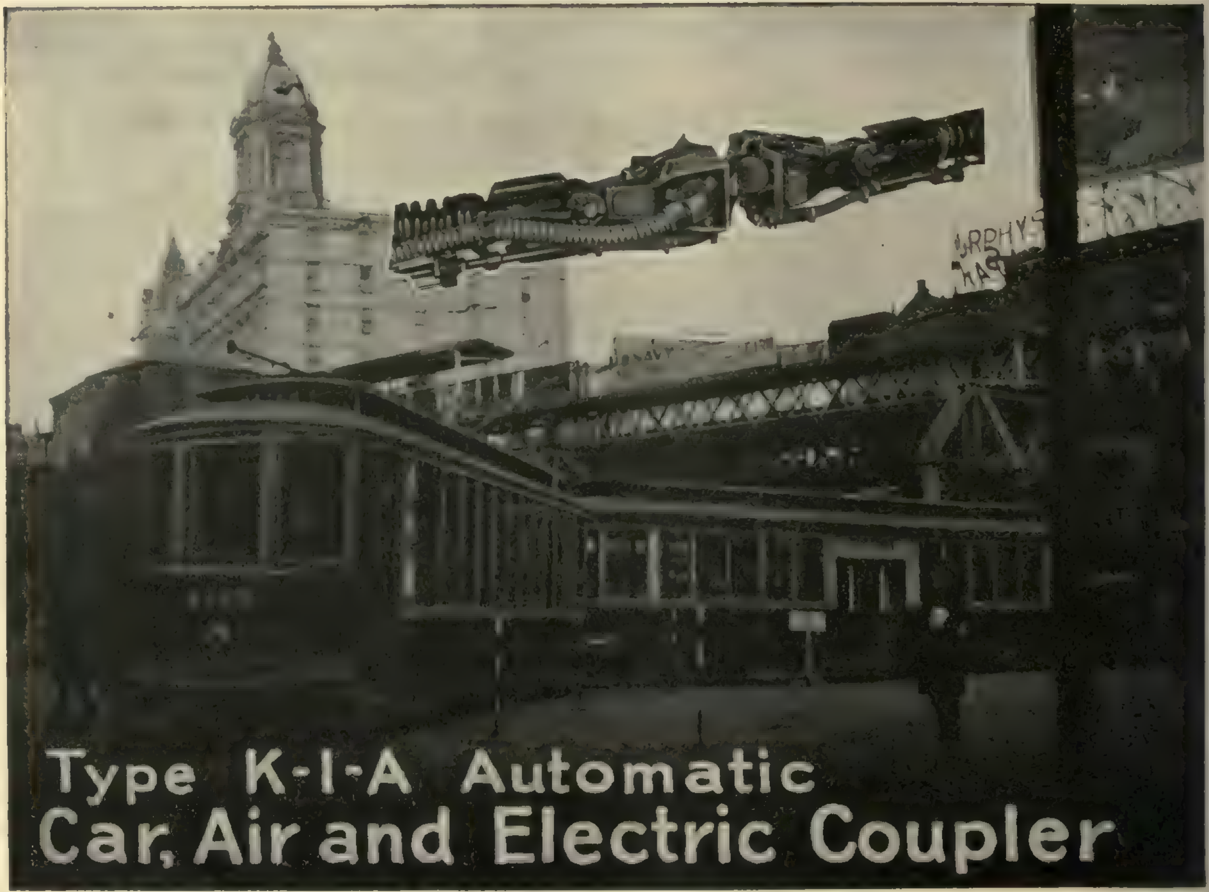
Roads using these grinders operate anywhere from one grinder to eighteen each to keep their rails in good condition



These Rail Grinders are used in twenty different countries and in practically every State in the Union

Railway Track-work Co., Philadelphia

"TIGHT LOCK"



OR WITHOUT THE ELECTRIC FEATURE

HERE is one of the most popular and efficient members of the Tight Lock Coupler Family—designed primarily for the lighter forms of multiple-unit operation, such as surface line trains.

Couples car, air and electric connections automatically and simultaneously. Banishes slack and consequently eliminates shocks, enabling the train to be operated with the same smoothness as a single unit.

Nineteen electric contacts of the butt type are incorporated in the coupler head, each insulated for 600 volts 25 amperes and protected from the weather by a rubber gasket after coupling is made. During compression each contact is made to rotate, thereby subjecting the contact surfaces to a rubbing or scouring effect that removes dirt or other non-conducting material which may have collected prior to coupling.

When breaking up a train the latches of both couplers are manually untripped, in which position they remain until the cars are separated, the separation automatically tripping the latch back to locking position. This is important in making up trains, as the couplers are always set and ready to be coupled again without further manual action.

Type K-1-A couplers may be used with or without the electric portion, provision having been made so that the electric feature can be added at any time.

Westinghouse Traction Brake Company

General Office and Works: Wilmerding, Pa.

"Fourteen Miles East of Pittsburgh"

New York	**Washington**	**Chicago**
San Francisco	**Pittsburgh**	**St. Louis**

The Safety Car Has Proved That Business Does Follow Service

Patrons of the Los Angeles Railway prefer the Safety Car.

e prophesied so three or four years ago. Today, we ardly know which one of the many successful cases to oint to as proof of our prophecy!

ut taking a large group of companies, we find:

First: That Safety Cars permitted 20 to 80% more service to the public—an average of 50%.

Second: That while some companies showed a greater gain in traffic than in car-miles and some showed a lesser gain, the average was 52%. More Safety Car Miles Brought 37% More Traffic.

urthermore, this splendid result occurred during a period frequent fare changes and constant growth of private tomobile competition.

Business Does Follow Service if your service is of the right kind, which means the operation of your cars with the standard Safety Device Combination so interlocked, that regardless of the illness or distraction of the operator, the power will be cut off instantaneously, the airbrakes and sander applied immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed and the step folded before the car can start, and when the air brakes must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

Let us help you duplicate the success of so many others.

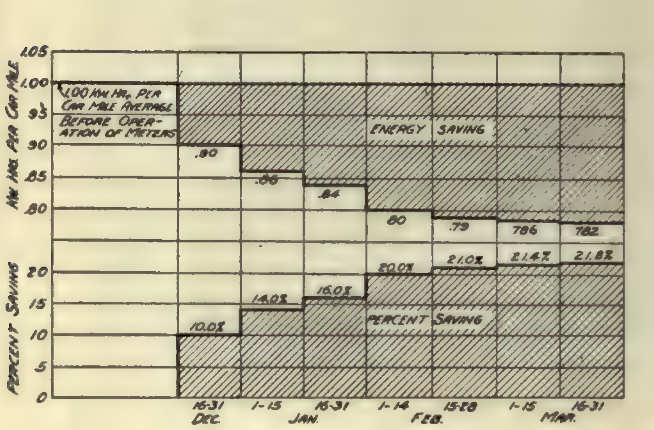
Safety Car Devices Company

Boatmen's Bank Bldg., St. Louis

Chicago San Francisco New York Washington Pittsburgh

Save 20% in Power on Safety Cars

Motorman Reading Economy Meter on Quincy Railway Company Safety Car.



Curves Showing Saving on Safety Cars on Quincy Railway Company

These roads are using Economy Meters on Light Weight or Safety Cars:

Quincy Railway Company
Kansas City Railways Co.
Seattle Municipal Railway
Butler Railway Company
El Paso Railway Co.
Keokuk Electric Co.
Beaumont Traction Co.
Albuquerque Traction Co.
Chicago North Shore & Milwaukee R.R.
Kankakee Electric Railway Co.
The Milwaukee Electric Railway & Light Co.

Illinois Traction System

(Quincy Division)

Safety cars are inherently economical of power but Economy Meters show striking result even on them

All of the 30 Safety Cars of the Quinc Railway Company have been equippe with Economy Meters since December 1920. The resulting saving in powe shows progressive improvement month b month, until it is now averaging over 20% of the total Traction Power.

Even at the low rate of 1 cent per Kw. H at the car, this would mean a total savin of $125.00 per car per year in power alone thus yielding around 200% on investmen in Economy Meters.

In addition a saving in maintenance o around 10 cents per meter day is bein made through use of the Inspection Dia Feature.

Equally good results are reported fron many other roads where Safety Cars ar equipped with Economy Meters.

In all over 60 properties operating cars of every description are completely equipped and earning 100 to 300% on their investment in Economy Meters

Ask for our rental or deferred payment plan

Economy Electric Devices Company

L. E. GOULD, Pres., Old Colony Bldg., Chicago

Cable Address: Sangamo, Chicago

National Railway Appliance Co., New York
L. A. Nott, San Francisco

Burton R. Stare Co., Seattle
J. G. Monahan, Los Angeles

Ludwig Hommel & Co., Pittsburgh
Grayson Railway Supply Co., St. Loui

O-B Trolley Catcher

—a worthy standard and an actual one

Feeding rope out for high wire, reeling it in for low, stopping the pole positively if it jumps—the O-B Trolley Catcher is ever active. It responds to the slightest movement of the rope.

Rugged simplicity is the chief feature of the O-B Catcher. It works freely and easily because of its simplicity. It works constantly and reliably because of its ruggedness.

Here's another thing. At every point where fit is involved the parts are machined on carefully designed jigs which perpetuate accuracy. You can take five, or five hundred, O-B Catchers, tear them down, mix the pieces and put them together again without a hitch.

Investigate and you'll agree with us that O-B Catcher is a worthy standard and an actual one.

The Ohio Brass Company, Mansfield, Ohio

New York, Philadelphia, Pittsburgh,
Chicago, San Francisco, Los Angeles,
Paris, France

Manufactures: Rail Bonds, Trolley Materials,
High Tension Porcelain Insulators,
Third Rail Insulators,
Car Equipment.

Photographs that Sell the Technical product

The McGRAW-HILL FIELD PHOTO SERVICE Department was organized some years ago in response to a widely felt need of furnishing a service through which advertisers could readily and economically secure striking installation pictures of their machines and apparatus in actual use. Approximately 700 McGRAW-HILL photographic representatives, locally distributed in all parts of the country, are now engaged in this work.

THESE photographers are carefully chosen for their prompt dependability in getting the picture they are asked to get—for their judgment shown in "taking" subjects to best advantage from an advertising standpoint—for their skill displayed in making photographs that reproduce effectively, and for their ability to get the news story while taking the picture.

This latter qualification is extremely important. Every effort is made to obtain the actual story of the machine on the job, and to assist in this we supply our photographers with carefully devised questionnaires to be filled out. The Field Photo Service Department always aims not only to get the picture but to get the story, and we make it a practice not to accept photographs from our photographers unless they are accompanied by the data.

THE advantages of this branch of McGRAW-HILL service to technical advertisers are obvious. Upon receipt of a list of installations we arrange all the interviews and secure the pictures. You are relieved of all worry and trouble and get your pictures and the story at minimum expense, besides having the satisfaction of putting the work into the hands of specialists on technical subjects.

MANY advertisers not only employ our Field Photo Service to secure definite lists of photographs, but give us a roving commission to take pictures of their machines wherever encountered.

IN connection with this department of McGRAW-HILL service we maintain a constantly growing library of stock negatives in the technical field. It contains at the present time about 3,000 photos, all of which are classified by subjects. Prints are promptly supplied at a moderate charge.

This Library of Technical Photographs is of special value to Advertising Agencies, a number of which frequently call upon its resources.

THE facilities of our organization for obtaining photographs of technical subjects are at the service of all who require such photographs. Primarily, however, it is an important link in the complete chain of McGRAW-HILL service to the technical advertiser. We not only write the proper copy for our advertisers, but we go out into the field for them and obtain pictures and stories which they are not in a position to get for themselves.

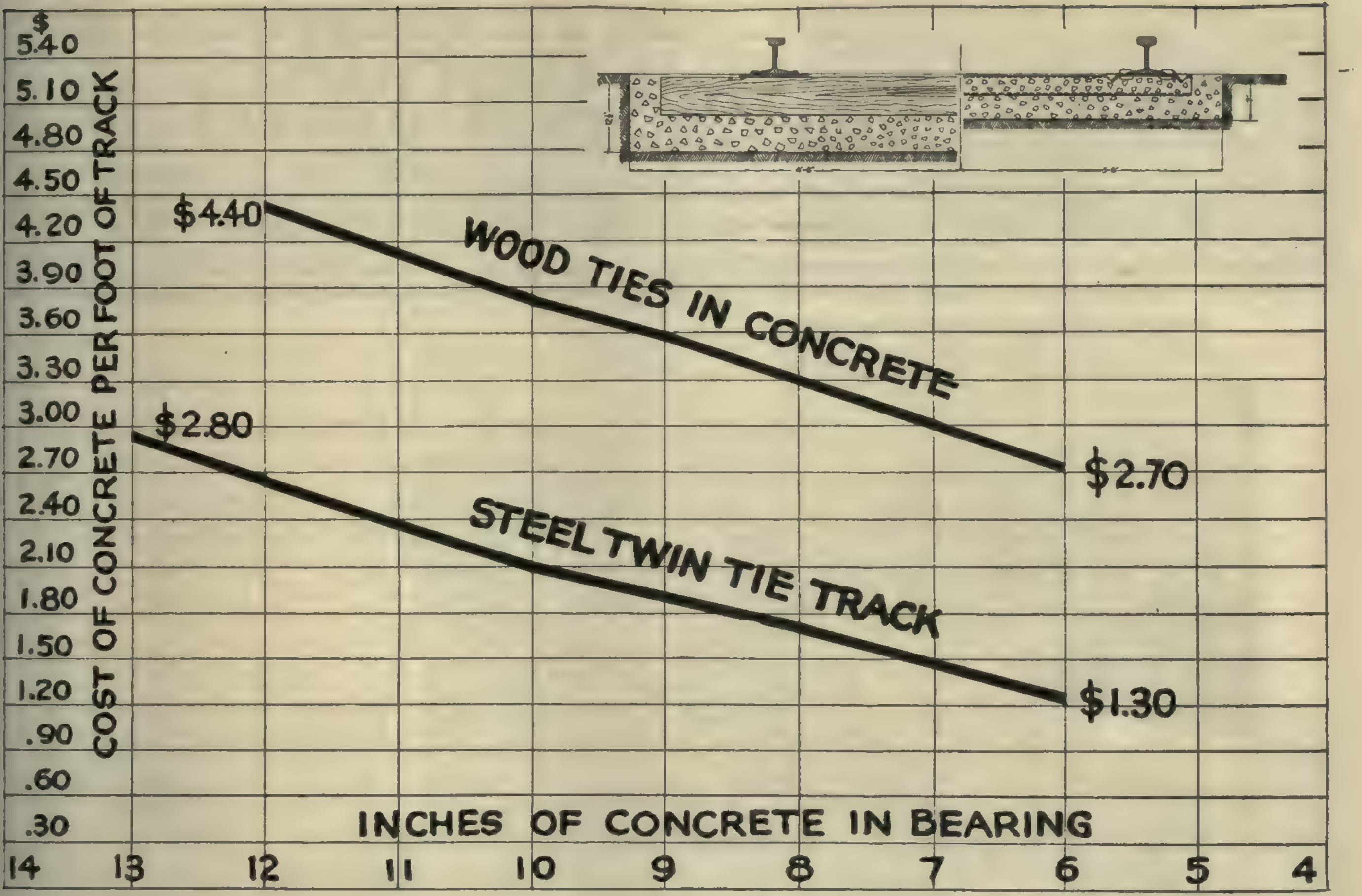
WE will gladly furnish detailed information regarding the cost and answer any questions.

McGraw-Hill Company, Inc.
Tenth Avenue, at 36th Street
New York City

Power — Coal Age
American Machinist — Electrical Merchandising
Electrical World — Engineering and Mining Journal
Journal of Electricity — Engineering News-Record
Ingenieria Internacional — Electric Railway Journal
Chemical and Metallurgical Engineering

McGraw-Hill Field Photo Service

We photograph your product on the job anywhere, and get the story of its service Available photos also supplied from stock — Specialists on technical subjects



Non-essential Concrete Costs More Than Steel Ties

IN conventional types of concrete track construction with wood ties, often *only 50 per cent* of the total cubic contents of the track foundation transmits the wheel loads from the tie to the subgrade.

The inefficient concrete between wood ties and at their ends is an economic loss when regarded as part of the track foundation.

The fundamental economy of Steel Twin Tie construction depends upon a more complete utilization of the concrete in the track foundation than is possible with wood tie designs.

The comparative initial economy of Steel Twin Tie construction depends on the type of construction with which it is compared.

In order to determine the possible saving on your property, include a comparative estimate with Steel Twin Ties on the work your track department has up for 1921.

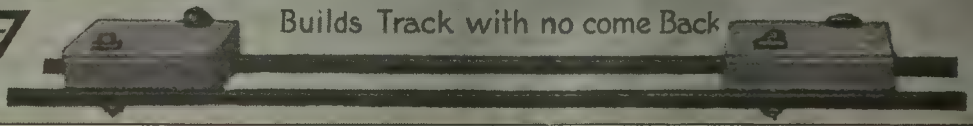
Price on Twin Ties at your delivery point will go forward by mail or wire at your request.

THE INTERNATIONAL STEEL TIE COMPANY, Cleveland, Ohio

International Steel Twin Ties manufactured and sold in Canada, by Sarnia Bridge Co., Ltd., Sarnia, Ont.

Steel Twin Tie Track

The RESILIENT RAILWAY TIE



Builds Track with no come Back

Detailed information as to the cost, service and delivery, requested now, will have you prepared when the construction season opens.

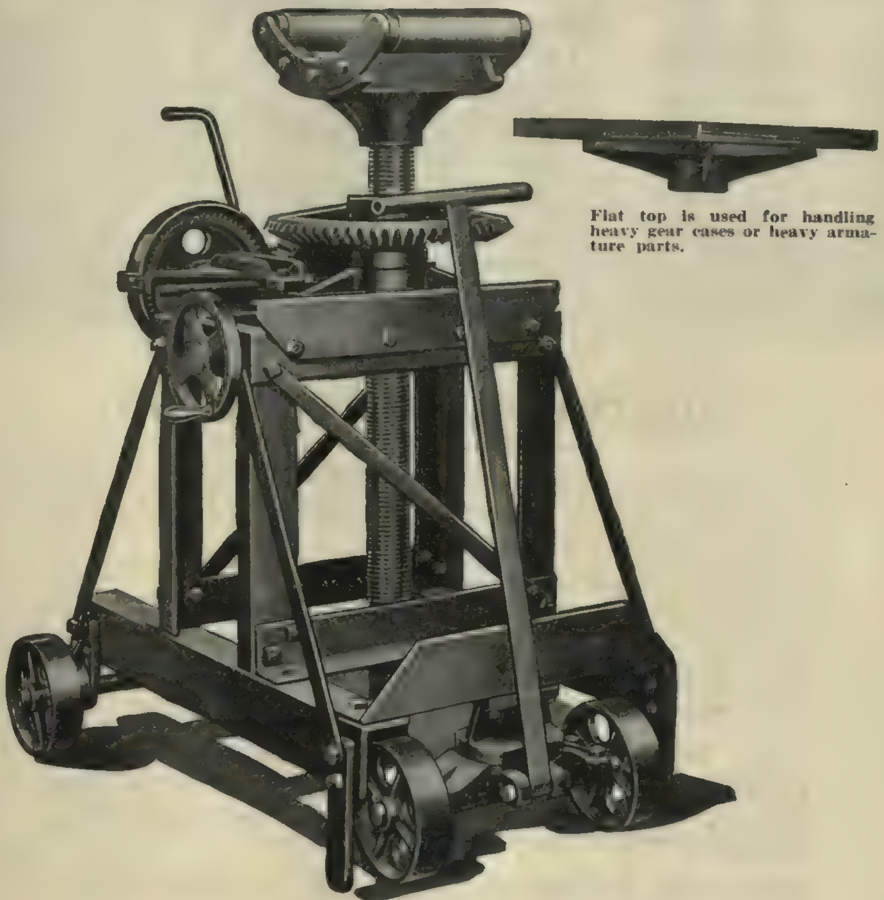
What We Learn From Others

The car builder—the motor designer, and the truck manufacturer, all provide ***Resiliency*** in their product. As it is necessary and has proven successful in these cases, why not apply to the track. If it were not for the springs in the car seats, in the trucks and on the motors, how long would it be before they were shattered to pieces. Why not, then, give your concrete track foundation the same consideration, and apply ***Resiliency*** to it?

THE DAYTON MECHANICAL TIE CO., 704 COMMERCIAL BUILDING, DAYTON, OHI

PEERLESS PIT JACKS

Absolutely Safe—Fine Adjustment—Two-Speed Operation



Flat top is used for handling heavy gear cases or heavy armature parts.

The new Peerless heavy duty pit jack is designed for work of every character required in the street railway pit. This jack is of the geared wheel and screw type, combining absolute safety with fine adjustment and two-speed operation.

The frame is built up of heavy steel angles thoroughly braced and allows for side adjustment of 10 inches. The top has a minimum height of 3 feet 9 inches and a maximum raise to 6 feet 3 inches, measured from the floor.

The Peerless heavy duty pit jack is operated by a handle and so arranged that two speeds are provided, a low speed ratio for lifting extremely heavy weights and a high speed ratio for lighter work, or for lowering.

This jack is regularly supplied with either cradle top for handling armatures or fitted with a flat top for handling gear cases, motor parts, etc. Tops are interchangeable and are listed separately so that it is possible to have one jack and two types of tops, changing the latter according to the character of work in hand.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

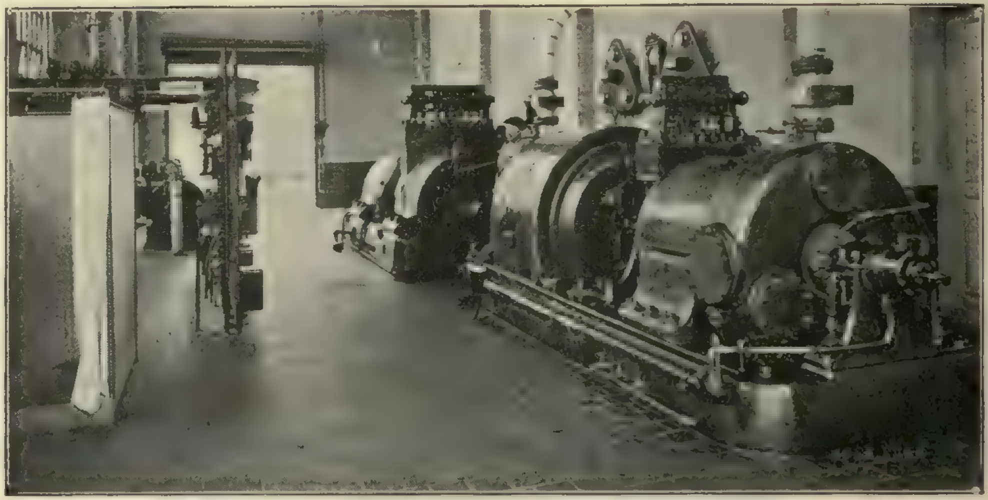
PHILADELPHIA
17th and Cambria Streets

NEW YORK
50 Church St.

CHICAGO
Monadnock Building

Branch Offices: Boston, Scranton, Pittsburgh

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto



Guaranteed Operation

is vital to many generating companies who give contracts to customers calling for forfeitures in case of interruptions to service.

Irvington Insulation is invariably used by these companies because it has stood the test of time. It prevents breakdowns because of its high resistance, high dielectric strength, non-hygroscopic qualities, heat resistance and neutrality to chemical action.

Since we originated black varnished cambric and placed it on the market twelve years ago its use has steadily grown until now we make more black than yellow—

And we are the largest producers of varnished cambric in the world.

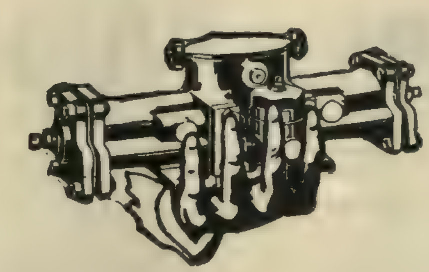
IRVINGTON PRODUCTS

Oiled Silk, Varnished Paper, Black and Yellow Varnished Cambric, Flexible Varnished Tubing, Special Folded Paper for Coil Windings, Insulating Varnishes, Slot Insulation

TRADE MARK
Reg. U. S. Pat. Off.

IRVINGTON VARNISH & INSULATOR Co.
Irvington, New Jersey.
Established 1905

Modernize!



Pneumatize!

Then: Excessive Concentration Upon Fare Collection Will Be Safe and Profitable Always

In a late letter to the *Electric Railway Journal* a manager, discussing accidents, pointed out that on a certain road "not 10 per cent of the conductors paid more than perfunctory attention to the opening and closing of the steps and doors." They had been told to go after the fares—and they did—but to the detriment of the accident account.

But with the doors and steps operated with National Pneumatic Door and Step Control Motorman's Signal Light and Safety Interlocking Door Control, your conductors *can* and *should* concentrate upon the collection of fares, because this National Pneumatic trio will do the door, step and starting job—and do it right!

National Pneumatic

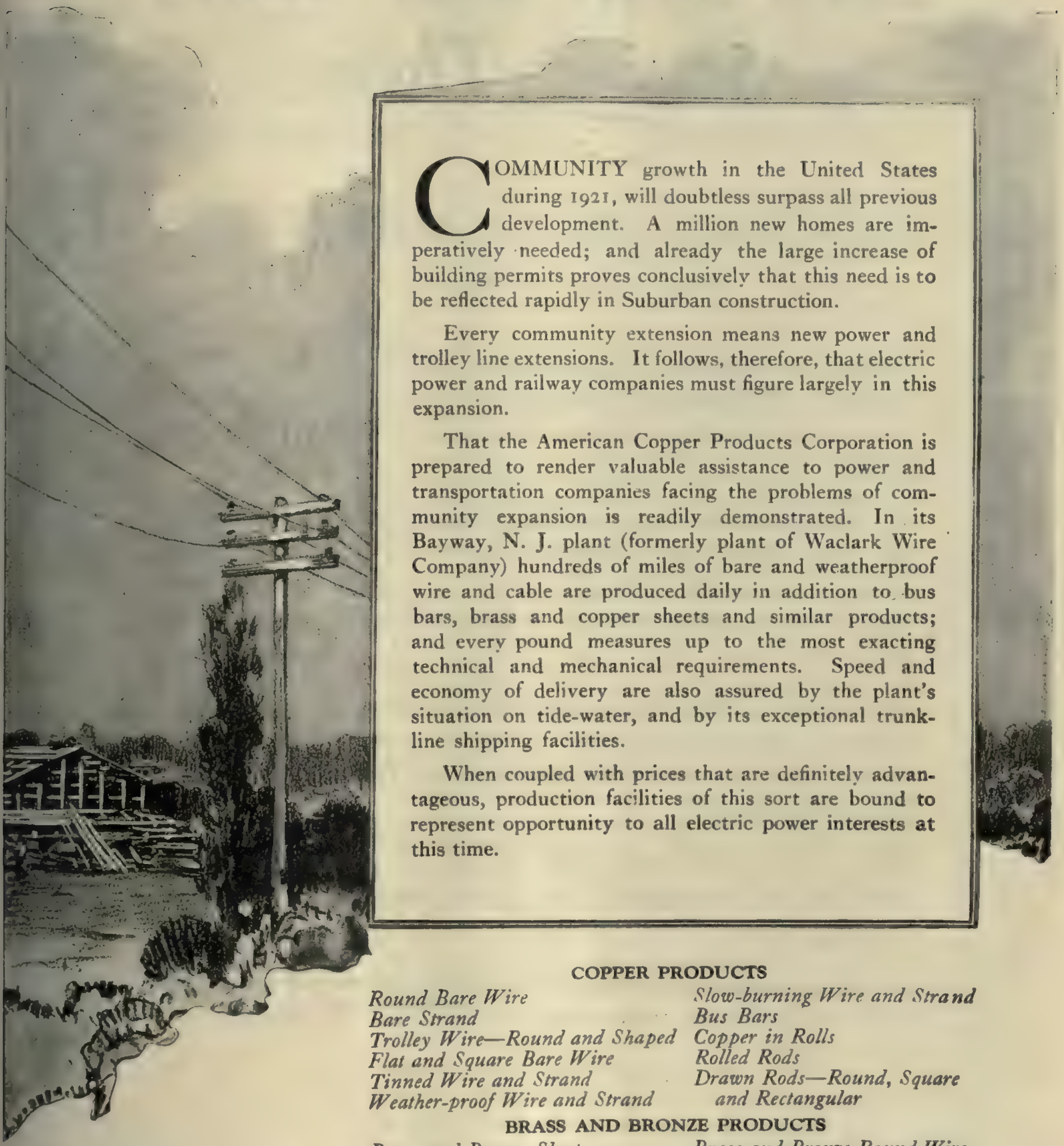
Door and Step Control
Motorman's Light Signals
Door and Step Operating Mechanisms
Interlocking Safety Door Control
and
Multiple Unit Door Control

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd.
Toronto, Ont.

National Pneumatic Company, Inc.
50 Church St., New York
Edison Bldg., Chicago
Works: Rahway, N. J.

WHEN COPPER WIRE FOLLOWS

COMMUNITY GROWTH



COMMUNITY growth in the United States during 1921, will doubtless surpass all previous development. A million new homes are imperatively needed; and already the large increase of building permits proves conclusively that this need is to be reflected rapidly in Suburban construction.

Every community extension means new power and trolley line extensions. It follows, therefore, that electric power and railway companies must figure largely in this expansion.

That the American Copper Products Corporation is prepared to render valuable assistance to power and transportation companies facing the problems of community expansion is readily demonstrated. In its Bayway, N. J. plant (formerly plant of Waclark Wire Company) hundreds of miles of bare and weatherproof wire and cable are produced daily in addition to bus bars, brass and copper sheets and similar products; and every pound measures up to the most exacting technical and mechanical requirements. Speed and economy of delivery are also assured by the plant's situation on tide-water, and by its exceptional trunk-line shipping facilities.

When coupled with prices that are definitely advantageous, production facilities of this sort are bound to represent opportunity to all electric power interests at this time.

COPPER PRODUCTS

Round Bare Wire
Bare Strand
Trolley Wire—Round and Shaped
Flat and Square Bare Wire
Tinned Wire and Strand
Weather-proof Wire and Strand
Slow-burning Wire and Strand
Bus Bars
Copper in Rolls
Rolled Rods
Drawn Rods—Round, Square and Rectangular

BRASS AND BRONZE PRODUCTS

Brass and Bronze Sheets
Brass and Bronze Round Wire
Brass and Bronze Flat and Square Wire

Mills, Bayway, N. J.

AMERICAN COPPER PRODUCTS CORPORATION

200 BROADWAY NEWYORK

Long Stops Cost Money Shorten Them

The duration of car stops is determined largely by fare collection. Unsystematic, haphazard fare collection means long stops. Systematic, business-like fare collection—short stops.

A very little confusion in loading will increase the stop duration 2 or 3 seconds. It doesn't take a very long run to have these unnecessary delays counted in minutes — and this means a decrease in service or the addition of one or more cars.

One of the contributing factors of delay at stops is the collection of multiple coin fares. Changing car design will not improve this condition but Johnson Fare Boxes and Johnson Metal Tickets *will.*

With this equipment on your cars all the advantages of the unit fare are retained with the greater revenue derived from the higher rate.

But this is only one of the reasons why Johnson Fare Boxes will increase your gross revenue 3 to 10%. Write today for *all* the facts.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Illinois

The World's best Lubricants

GALENA QUALITY

Performance—the proving ground of service

It does not require engineering statistics to convince the practical mechanical man that ordinary oils cannot fulfill the requirements of railway service.

There is one, and only one, reliable test of the ability of lubricants—that of performance in actual service. It is this conclusive test of merit that has caused *Galena Oils* to be specified by the great majority of America's electric railways—they have done and are doing the work with an efficiency and economy that deserves and demands such preference.

It is the implicit confidence in the ability of Galena Oils—built upon the foundation of many years of unvarying, faithful performance—that enables this company to *guarantee* the delivery of lubrication service as specified by contract

With less confidence in the quality or uniformity of a product, it is quite natural that such guarantee of performance cannot be made. Hoping to make good and *guaranteeing* to make good are two quite different propositions.

The unanswerable argument for Galena Oil quality must lie in the fact that they are the only railway lubricants that are absolutely guaranteed to perform specified service, the failure of the lower grade oils to give like service—after many trials — emphasizing by contrast the conspicuous merit of Galena products.

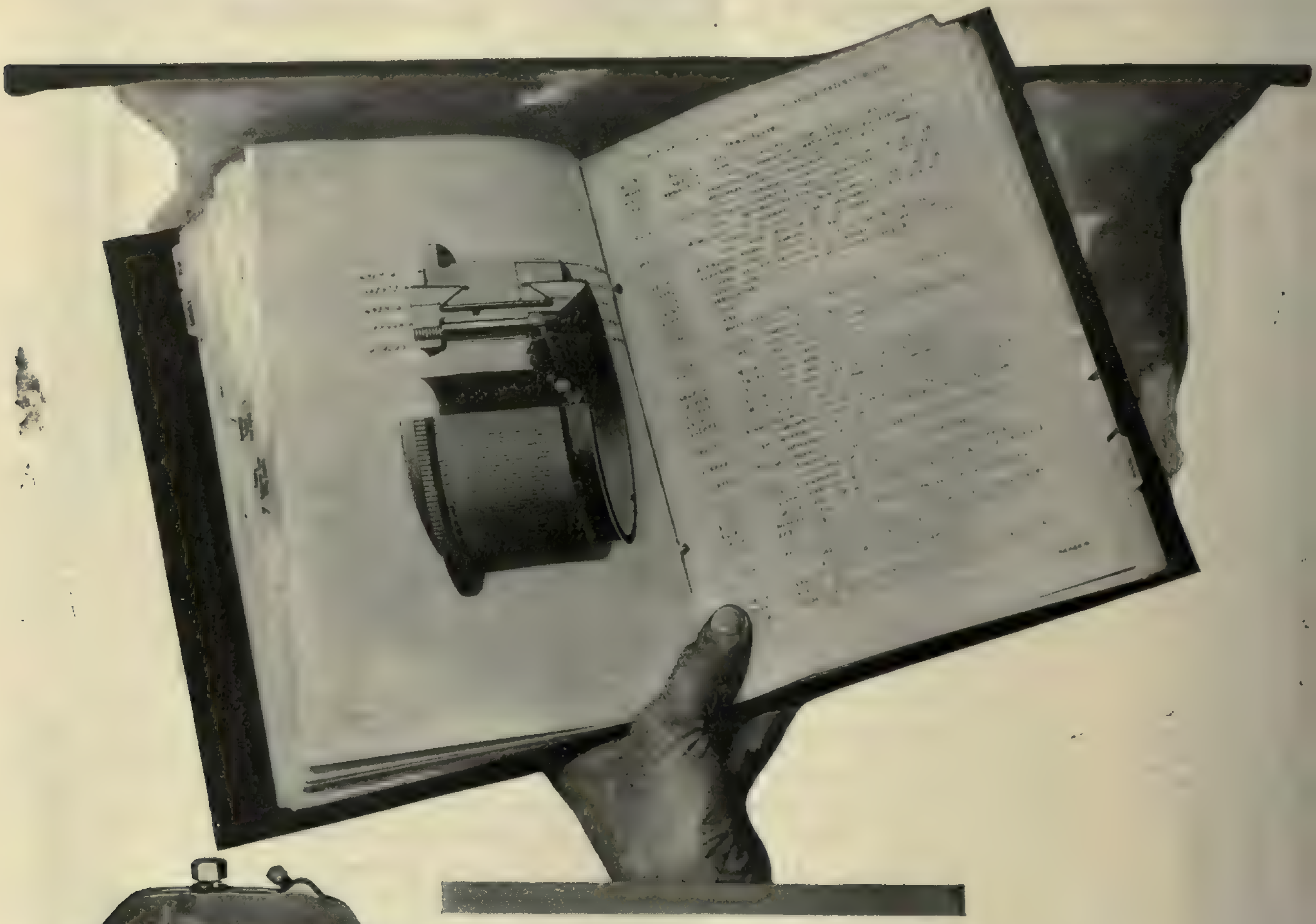
Galena Quality Is Our Bond and Your Security!

TRIGRAM G S O © TRADE MARK

THE GALENA-SIGNAL OIL CO.
NEW YORK FRANKLIN, PA. CHICAGO
Offices in all principal American Cities
LONDON BUENOS AIRES PARIS

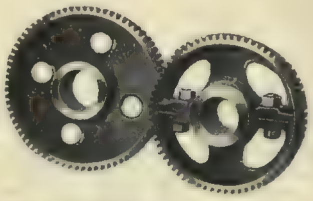
GALENA SERVICE

Every good railway man knows he cannot keep his equipment working at high efficiency if he picks renewal parts at random



Form N Removable Pan Trolley Frog.

Porcelain Insulators for Car Resistors.



Grade B and Grade M Gears. Extensively Used on Railway Motors.

Standardize on Good Material Then Stick to It—By The Book

The G-E Renewal Parts Catalog is the friend and ally of every wise master mechanic and purchasing agent of the hundreds of railways using General Electric Company equipment. They keep it within easy reach.

They also keep it up-to-date by inserting sheets that go out with all new equipments.

This loose-leaf book saves them hours of time. It is so arranged and indexed that a glance enables them to select exactly what they need every time they order.

G-E warehouses and shops all over the country fill those orders quickly.

That is G-E service.

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

40-164

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing Editor
HARRY L. BROWN, Western Editor N. A. BOWERS, Pacific Coast Editor H. S. KNOWLTON, New England Editor C. W. SQUIER, Associate Editor C. W. STOCKS, Associate Editor
DONALD F. HINE, Editorial Representative A. D. KNOX, Editorial Representative GEORGE BUSHFIELD, Editorial Representative
G. J. MACMURRAY, News Editor

Volume 57 New York, Saturday, April 23, 1921 *Number* 17

Electric Railway Day on May 4

IT WAS a happy idea to have an "Electric Railway Day." The time is short in which to prepare for any extended celebration, but impromptu affairs are often the most successful and no elaborate program is necessary to do something. It does not take long to resurrect one of the early cars and put it in charge of an old crew for operation on May 4. From this step to advertising for some of the first passengers, getting together some facts about the kind of service furnished, length of ride and fares charged in the early days, and following some of the other suggestions made by President Gadsden, is not a difficult one. If the idea of "Electric Railway Day" works out well on the smaller scale which only is possible this year, a more elaborate plan can be arranged for next year. The advertising department of the association is co-operating to the full extent of its ability by making suggestions of what to do, and it is hoped that as many companies as possible will try out the idea.

In Union Is Strength, Especially in the Freight Business

THE handling of freight and express matter is a legitimate function of electric railways and when it is properly done it proves to be profitable. George M. Graham, vice-president Pierce-Arrow Motor Car Company, threw down the gauntlet before the electric railway industry last October when at the Atlantic City convention he said: "Except in isolated cases the suburban trolley is barred from developing any considerable volume of freight haulage." This disqualification, Mr. Graham thinks, results from the confinement of the trolley car to a fixed route. His challenge must be met, not with words but with profits. The companies which are transporting goods, as well as people, must show with the aid of accurate accounting that they are making money in this department, or that they can do so if given adequate facilities.

Interurban railways have been engaged in handling l.c.l. and carload freight traffic for many years. Their experience has not led them to consider abandoning this business. The recent motor-truck competition has stimulated their interest rather than discouraged it. The truck has one outstanding virtue, ability to pick up, transport and deliver goods in one handling. Lack of this ability is admittedly a handicap to the trolley, but this does not outweigh its many inherent and unique qualities. The possession of a well-graded steel runway, of highly efficient propulsion equipment, of durable wheel tires and motive-power equipment, of almost unlimited speed capacity, of ability to operate with small labor cost per ton-mile of freight movement, of skill in transportation management, of an effective maintenance organization, etc., is surely going to count for something.

But the electric railways must pull together to get the best results in this line. They must go after their legitimate share of the business with vim and with skill. The up-to-date spirit in this matter was voiced at the recent New York City meeting of the New York Electric Railway Association, at which encouraging facts were marshaled. One feature was a brief account of the co-operative movement in Rochester, visualized in the new freight terminal. Elsewhere in this issue is an illustrated account of the new terminal with some detail of the business which centers in it. Three strong interurbans are co-operating at Rochester. They are getting results. Their experiences will be interesting, stimulating and otherwise helpful to other roads which now handle freight or expect to do so.

The American Association Is Being Reborn

CERTAINLY railway men who read the report of the meeting of the executive committee of the American Electric Railway Association, printed on another page of this issue, will consider that the association is to be congratulated, and duly thankful, that it is under the leadership it now has. If any one had any doubts as to the correct answer to Mr. Wehle's question of a few weeks ago as to whether the industry would appreciate and follow the leadership of its president, Mr. Gadsden, such doubts must now be disappearing or dispelled.

In the unpleasant situation which recently arose at the headquarters of the association, it would have been easy to let events control, merely to pull through and continue on the old plan as efficiently as possible. But what has been done is that President Gadsden has taken control of events, has seized upon this as a psychological moment, when all eyes are focused on, and attention easy to get for, association activities, to give the association a new lease of life; perhaps it would be more nearly to the point to say to give new birth to the association that it may have added life and virility the more effectively to perform not only its past functions but new ones which far-sighted leadership can see are waiting and desirable, yes, even necessary, for it to assume.

The executive committee is behind this program to a man. The special committee which President Gadsden has appointed to make a study of the association's activities and to make recommendations it deems desirable should have the hearty co-operation and advice of the entire membership. Certainly there is assurance that under Mr. Gadsden's leadership it will be a working committee and it should bring in constructive suggestions of value to the association.

There is every indication that the association will thus capitalize its present misfortune and emerge a stronger, more useful force both in the industry and in national affairs.

"Value of Service" as a Valuation Criterion

THE basis of the valuation of the Public Service Railway of New Jersey, as outlined in the letter of transmittal of the engineers, Ford, Bacon & Davis, is one which must appeal to engineers, economists and men in public affairs as being eminently sound and just. This letter was quoted at length in last week's issue of the ELECTRIC RAILWAY JOURNAL. The details of how the various elements or indices of value were arrived at are presented this week. The article shows the figures upon which the engineers have based their judgment; the letter last week gives the theory which has guided the engineers in reaching their conclusion, in balancing the various indications of value in their own mind, in order to arrive at a figure which can be said to represent the value of the railway upon which rates, or condemnation proceedings or purchase might be based.

For, be it understood, two of the most important figures in this work—the operating efficiency and the final value determined—are admittedly, and necessarily, matters of judgment. It will be recalled that the New Jersey law, under which this valuation was made, provided that the valuation declared by the engineers employed by the Special Valuation Commission should be the value of the property in so far as value was an element in fixing rates. The engineers, by law, therefore had the status of a judicial or quasi-judicial body. It was remarked in these columns at the time the work was started that the engineers in charge had an opportunity, and a duty, to advance the science or art of valuation to show what the engineer, with full authority, could do in this most debatable field of engineering, law and economics.

True, some three or four days before the report was filed, the New Jersey Legislature passed an amendment to the law making this valuation subject to review on certiorari and providing that the engineers could be cross-examined on the method and figures by the use of which their final valuation was determined, and further, that the Public Service Commission could offer other evidence as to value; but it was still provided that this valuation be "presumptive evidence" as to the value of the property. However, this valuation was made under the provision of the original law, and it is now pertinent to examine the result to see what has been done by the engineers. It is necessary to consider their summary or basis of valuation separately from that part of the report which shows how the various figures were obtained, as will appear later on.

"Value of service" as the ultimate test to apply in the economics of a regulated public utility is so sound as to require no supporting argument. It is the one criterion applied by extremists of all sorts as well as by more moderate unbiased students. The trouble all comes in deciding what the "value of service" really is. The present instance is a good example of consistent and constant subjecting of each item to the test of whether it contributes to the value of service as interpreted by the engineers who have assumed, rightly, the position of deliberator as well as performing the duties which are more frequently the only ones demanded of engineers. This does not mean that one may not differ with the conclusions reached, however.

Value of service is defined by the engineers as follows:

> The sum of operating expenses, including depreciation and, when necessary, allowances for obsolescence; taxes which are fixed by law, and interest as determined above (defined as being rent of the property whose cost of reproduction has been determined), constitutes the cost of service, and when there is added to this cost profit in an amount sufficient to induce capital to flow into the industry, we have an accurate estimate of the value of the service.

The interest or "rent" becomes at once the debatable item. The object, the engineers say, is to prove the property to have a real value based on the anticipated profits from its use. These profits, in an amount equal to those obtainable in an unregulated industry, safety of investment being equal, must be allowed by any rate-making body or otherwise property would be taken without due compensation.

There can be no question, in view of all past practice and court and commission decisions, of the various items which have been set up to weigh, or consider, in arriving at the final figures. Costs of physical property, and the usual overheads, were determined in the usual way, using inventories made on previous appraisals. Intangibles, as usual, are the items which will cause debate. Of these, the ones which present interesting features are "going value" and "consolidation value." "Power lease," while given a definite value, is discussed with these. They are said to "be represented by the company's income, the market for the securities, etc." It is more than probable that the engineers under the new law will be called upon to substantiate the figures under these three heads.

Going value is a figure increasingly admitted where the development of the business has resulted in early losses or lack of return in early years uncompensated in later years. That the history of most public utilities shows such an item is well known. In this case, the engineers could find no documentary evidence either positive or negative. But they are apparently on firm ground in making a reasonable allowance for this.

Consolidation value is, it is believed, open to more careful examination. If this valuation is carried to higher courts, and this question can be singled out, a decision upon the inclusion of such an item as an independent element of value will be most important to the electric railway industry. Consolidation value is defined in the report as

> that element of value which attaches to a strong unified system as contrasted with the uneconomical condition under which smaller companies, often with diverse interests, operate in the same or adjacent territory.

This element of value is arrived at by capitalizing the estimated savings of the consolidated system as compared with a number of independent companies. Another indication of this figure is obtained by considering the price paid for the component parts of the present property, their physical values and their earning power. There is no doubt that expenditures which have been perfectly legitimate and necessary in the public interest were made to effect consolidations in electric railway systems. It is a question, however, whether it would not be more sound to amortize such expenditures rather than to capitalize them permanently.

This view is strengthened by comparing this treatment of this question with the statement of the engineers that, in their desire to base this value of service on the cost to produce a theoretical modern plant, they use the existing plant of the company, for they say:

> We are of the opinion that it would be impossible to produce a theoretical modern plant at materially less cost than the cost of producing the existing plant of the Public Service Railway.

The power lease, to which the engineers have given a present value of $19,149,000 and a pre-war value of

$11,194,000, is listed among the items which they have considered and weighed in their determination of the final figure of $125,000,000 Its value was determined by capitalizing the savings which were effected by purchasing power from the sister company, the Public Service Electric Company, rather than making it in the plant which was leased to the electric company; to this was added the value of the power facilities turned over. The lease is of value to the railway and its patrons. The arrangement is also said to be of value to the electric company, which practically owns the plant under the New Jersey law. The question naturally arises as to what extent it may be capitalized in both places.

This valuation has been discussed at this length with a view to encouraging further discussion by valuation engineers on some of the points involved. While the ability of the New Jersey Legislature to say that any sum set up by any body created by it is the value of a public utility was questioned when the law was passed, the ideas which the engineers advance in their valuation must have an effect upon a court—such as the Supreme Court of the United States—which may have occasion to pass upon the valuation. It is certain that unusual interest attaches to this valuation and, though some particular items will probably be subject to attack before the new Public Service Commission, or in court, the engineers are to be congratulated upon the constructive work they have done in valuation practice.

Valuation by Legislation and Based on Earning Power

NEW YORK has added an element to the valuation situation which raises two interesting questions. One of these, like that in New Jersey, is to what extent a legislature may lay down any rules or regulations for making valuations. The other is the introduction of "prospective earning capacity" based on a contract rate as a consideration in determining value.

As to the first point, it seems very doubtful that any legislature can lay down any rules for valuation which will have any delimiting effect in case the question of confiscation is raised before the federal courts. If a correct interpretation has been placed on the Supreme Court's decision in the Ben Avon Borough water case (see ELECTRIC RAILWAY JOURNAL, Sept. 25, 1920, page 581) no intricacies of state law or procedure can militate against a utility's having federal court protection against confiscation. Thus the clause in the New York law "but such valuation shall not in any case exceed the fair reconstruction cost of the property less depreciation" is probably without weight and effect.

As to the second point, however, the New York Legislature, by formal enactment, has given recognition, and therefore weight, to the consideration of earning power as an element of value. While the Supreme Court of the United States apparently will not allow any other judicial body or any legislature to exclude any factor from consideration in determining value, it does practically invite suggestions as to other indications of value when it says, in the now famous case of Smyth vs. Ames, "we do not say that there may not be other matters to be regarded in estimating the value of the property."

There is, therefore, nothing out of the way in the New York Legislature's requiring the transit commission to consider the "estimated prospective earning capacity" as an element of value. It may well add to the clarification and crystallization of valuation theory and practice. The exact meaning or interpretation to be put upon the phrase may not be so easily determined until put into practice. Governor Miller has, however, as indicated on another page of this issue, explained his philosophy upon which the statement is based.

Prospective earnings are certainly the principal basis upon which a free purchase of any business is made. That they should have some relation to the value of a property seems self-evident. And it is not so perfectly clear that such a line of argument is proceeding in a circle, either, for, when prospective earnings are estimated, it is on the basis of a rate of fare or value of business which is taken as being fixed—in this case a contracted fare. It cannot be the sole basis of a valuation, but it seems not unsound to consider it as an element or indication.

The City Fare Should Be More on the Interurban Car

PRACTICE universally favors the exclusion of local passengers from interurban cars in terminal cities. On out-bound trips this enables the long-distance passenger to become comfortably seated at the commencement of his journey and also eliminates unnecessary local stops to discharge passengers. In consequence, in-bound cars stop to discharge passengers only.

This is all right so far as it goes, but in Cleveland a further step has been taken. This is to make the fare on the interurban car definitely higher for the city run than on the local car. Such a fare is justified as regards the interurban passenger. The speed is higher, the car is more comfortable and the passenger rides the entire distance to, or from, the city zone limits and is therefore always a long-distance rider. Moreover, such a higher fare will tend to keep the local passenger off. The Cleveland plan looks logical.

Utilities Prove a Millstone to Kansas Industrial Court

THE Kansas Court of Industrial Relations, created as a result of the Kansas coal mine strike in the winter of 1919-1920, was intended primarily to deal with industrial disputes and to make a study of industrial conditions in the state. But in the interest of economy, and since it was a regulatory body as well as a court, it was given, as an "incidental" duty, the functions of the Public Utilities Commission which was abolished. Now, as related in the news columns this week, the Public Utilities Commission is re-created, and the reasons therefore are worthy of comment.

It seems that of almost 700 cases to come before the court all but thirty-five were in the "incidental" line of public utilities. Thus, said Governor Allen, the principal purpose of the court is smothered; the industrial court, which was created to build up the industry of the state and to bring about better industrial relations, is in bad odor with the public because it has had to do the unpopular thing and raise utility rates. Apparently the regulation of public utilities was found by the members of the court, who have performed their duties in a most commendable and high-purposed manner, to be more than incidental.

When the proposal was first made to separate these two functions and create a public utilities commission again, there was a justifiable disappointment that this Kansas experiment of having one body with jurisdiction over both capital and labor might not continue for a longer time. Public utilities have suffered—capital, labor and the public, too—from regulative measures which have had relation to only one of the two factors—rates and wages. Governor Allen points out, however, that only three of the public utilities cases have involved questions of both wages and rates. But, to provide for such contingency, the Legislature empowers the court and commission to sit as one body and decide both wage and rate cases as one. Thus is the principle retained and utilities given the opportunity to have both sides heard at once. Further, with the re-creation of the commission the importance of an able supervision and regulation of public utilities is emphasized.

The London Motor Bus Myth Again

IN PAST ISSUES there has been pointed out the downright mendacity of wildcat motor-bus promoters in attempting to make out a case for their stock-selling schemes by alleged performances of the motor bus in London. So long as such statements are confined to the prospectuses of these modern Wallingfords they deceive only a small number of unthinking investors. It is a different matter, however, when so reputable a paper as the *Boston News Bureau* is deceived into giving space to misleading data, for it is, and has been, copied far and wide by newspapers which cannot be expected to check up the veracity of the items clipped from reputable exchanges.

The item in question was contributed from London by Herbert N. Casson, once a newspaper man and writer on a variety of topics in America but more lately an efficiency magazine publisher among the British. Mr. Casson says in an outburst that recalls his American period: "Last year's figures are a surprise to every one. It appears that the buses are now carrying twice as many passengers as the tubes and four times as many as the street cars."

Well, this is not only a surprise, but a grievous and dismayful shock, for in American ignorance reliance had been placed upon no other authority than that of the Advisory Committee on London Traffic, which reported to the Minister of Transport as follows:

DIVISION OF TRAFFIC AMONG THE VARIOUS TRANSPORT MEANS IN LONDON METROPOLITAN AREA IN YEAR 1919

Suburban traffic on main lines	468,000,000
Local railways	253,000,000
District Railway	140,000,000
Tube railways	266,000,000
Total of non-surface transit	1,127,000,000
Motor-buses	861,000,000
Tramways	1,053,000,000
Total traffic all means of transit	3,041,000,000

Complete figures for 1920 are not yet available. But figures so far received indicate that there is no great variation, for 1920, from the general proportions indicated in this 1919 report.

To contradict so exuberant a transportation authority as Mr. Casson is distasteful, but it is submitted that, except in the company of the Mad Hatter and the March Hare of "Alice in Wonderland," the tramway figure of 1,053,000,000 is larger than the bus figure of 861,000,000 and by all odds is not one-fourth of the bus figures. Now, as a matter of fact, Mr. Casson seems to have come to his conclusion by paying no attention to any transport undertaking outside the pale of what is popularly known as the "London Traffic Combine," namely, the group of underground, bus and tramway lines under the direction of Lord Ashfield, as distinguished from the municipal tramway systems. In fact, a check of the figures in Mr. Casson's original article against those of the Ashfield group alone for 1920 shows that they are identical. Without going into more detail figures, it is true that within the combine itself the motor bus is the greatest carrier, then the underground lines and finally the tramways.

Those who are really familiar with London transport matters know that the tramways of the combine, namely the Metropolitan Electric, the London & Suburban, the London United, etc., never have been big factors in its operations, inasmuch as these are suburban systems in rather poor territory. On the other hand, they also know that the bus has always had the monopoly of surface transit in the richest areas of London for purely physical conditions that call for no elaboration here. That these tramways, plus the great system of the London County Council and smaller municipal tramways, should be carrying over a billion riders a year is more remarkable than the record of the buses. As Mr. Casson goes out of his way to cast slurs upon the municipal tramways, he must have been aware of their existence, yet he ignores them in his remarkable comparison.

The management of the London General Omnibus Company could not for a moment be assumed to countenance such incomplete statistics as these. As operators, also, of both underground railways and surface tramways, they may be presumed to know something about the relative virtues of each. It is not on record that they are eliminating the subways and tramways that they have, although they are sometimes obliged to parallel their own services part of the way with buses because the latter have the good fortune of starting from the traffic centers, and of course they could not very well stop short on coming to a tramway route. The recent introduction of forty-six-seat and fifty-four-seat buses is in itself a compliment to the seventy-eight-seat tramcar of London (not to mention the London County Council train operation) for they know that the dominant cost item in transportation is platform labor.

In any case, the purpose of this is not to take up the cudgels for the tramcar as against the bus. There is nothing in an antagonism which, in this country, is carried on more to bait the street railways than for any sound technical reason. If the experience of Great Britain means anything to this country there is going to be a great deal of bus operation where the traffic is too thin or too fluctuating to justify a trackway; and such bus operation will naturally be a part of the local street railway system. In London, the motor-bus is doing a wonderful piece of work in mass transportation, and, to a certain extent, also in Paris. But elsewhere in Europe, the bus is an auxiliary and not the whole show nor even a big factor in the total number of passengers carried. As an example, one may quote Liverpool, which is operating scores of buses for certain tie-up and through routes; but which is also planning high-speed right-of-way tramway lines as the most economical method of carrying trunk-line traffic.

In conclusion, it would be utter waste of time to judge the various forms of transit on the basis of financial results during the last hectic years. Street railways, motor buses, subway lines, elevated lines, suburban lines, interurban lines, trunk railways—each and every one of them can show failures galore, but it is not safe to draw any deductions therefrom without a prayerful study of all the factors in the case. Hadn't newspaper writers better leave this subject to those who are earnestly striving to carry the public in the most comfortable and economical manner regardless of whether gas or electric propulsion is used? Why rock the boat in such stormy days as these?

The Cleveland Wage Agreement Points the Way

COMMON SENSE has prevailed among the trainmen of the Cleveland Railway Company and the way has been paved for a wage scale in keeping with the downward trend of living costs. By almost unanimous vote of the unionized conductors and motormen, the company's proposition of a 20 per cent reduction in wages has been approved and working conditions will be adjusted to a more normal basis. The 20 per cent reduction means that the base rate per hour after May 1 will be 55 cents for the first three months' service, 58 cents for the balance of the first year and 60 cents per hour thereafter. This gives hope of building up the interest fund to a point where it will not be necessary to consider another advance in the rate of fare. In addition, changes made in working conditions eliminate extra pay on swing runs due to their spread and reduce the pay for extra work performed on week days from time and one-half to time and one-quarter. No change is made in conditions governing Sunday and holiday work in such cases.

Much credit is due President John J. Stanley for the manner in which he handled this situation. By taking a positive stand months before his contract with the trainmen had expired, he won the support of the people who were interested in having their fares kept as low as possible. He was ready to arbitrate the question in accordance with the terms of the agreement. The employees, sensing the public frame of mind, were not even willing to take chances with a board of arbitrators which might hold them to conditions less to their liking than those offered by the management. They also took a wage scale two cents lower than that which they might have had with an "open shop."

Cleveland has had one of the highest wage scales in the country. Its agreement is expiring earlier than that of many of the larger properties, and the effect of a voluntary acceptance of a 20 per cent reduction in wages by the men should be felt elsewhere. The modified working conditions will also have an appreciable bearing on cost of operation, and the public will get the benefit of service which can be given without the present penalties. Evidence given before the War Labor Board by several companies showed that street railway work cannot be confined to the number of hours which govern in other industries. The nature of the business, the riding habits of the people make this impossible. It should have been apparent, therefore, that it was unfair to penalize the companies for spreading their work beyond a fixed maximum.

Some companies have working conditions even more costly for the management than those prevailing in Cleveland. These should be changed, and the outcome of the Cleveland dispute will doubtless help to bring about the change. The employees had their way when the labor market was "short." Spread of unemployment and ability to get men to work on company terms have turned the scale. A period of deflation is at hand, and the wise employee will accept the offer of the prudent manager in a wage scale which need not be stingy and should not be extravagant. The coming summer should witness a general turn "back to normalcy."

Texas Five-Cent Fare Decision Should Not Be Misinterpreted

THERE are so many statements and comments still being made about the decision of the Supreme Court in the 5-cent fare case of the Public Service Company in San Antonio, Tex., that it is worth while to call attention, again, to the salient facts in the case. The full text of the decision, not available last week, is now at hand and it is apparent that while the decision, being from the Supreme Court, is of nation-wide significance, its direct application depends upon state constitution or law.

What the Supreme Court has said is that San Antonio did not have the power to execute the contract which it tried to execute, or thought it did execute, with the railway company. The company is not, therefore, bound by the terms of the agreement. In the absence of a contract, the city cannot enforce a rate which is confiscatory, as that is against the Federal Constitution. This decision, therefore, while of great significance to the industry is limited in its application to the condition where the city does not have the power to make a binding contract.

The situation where both parties have the power to make a contract was not considered in the San Antonio case but was treated in a decision which the Supreme Court rendered on the same day in the case of three Iowa electric lighting companies. There the court said, in quoting previous opinions in several cases, including electric railway cases in Detroit, Cleveland and Columbus, that where public service corporations and government agencies have power to contract as to rates and exert that power by fixing by contract rates to govern during a particular time, the enforcement of such rates is controlled by the obligation resulting from the contract and therefore the question of whether such rates are confiscatory becomes immaterial.

The San Antonio case, then, does not abrogate all franchise rates in the United States; it does not restore valuable property which a man has foolishly sold for less than its worth; but it does give one more assurance that confiscation will not be allowed.

Quotation from the Federal Electric Railways Commission Report

No. 17

THE full co-operation of labor in the street railway industry will not have been brought about alone by the recognition of the right of collective bargaining which we have just been urging. Such recognition is but a foundation for full co-operation. The actual work of insuring it must come from the employees themselves, to whom the right of collective bargaining is thus given. For that right carries with it a duty. It would seem to be the duty of the organization which bargains for the individual worker to interest itself actively and unremittingly in his delivering to the company his best strength and intelligence.

This commission thinks that where the street railway worker has the right of collective bargaining the public has the right to expect that the organization or association representing him will not only procure his wage but will also continuously stimulate his wholehearted constructive co-operation with the company and his effective service to the public.

THE CENTER OF THE ELECTRIC FREIGHT BUSINESS IN ROCHESTER, N. Y.

Freight Co-operation at Rochester

Three Interurbans Are Operating a Union Freight Terminal that Was Designed to Be Simple, Inexpensive and Convenient—It Is Managed by a Board of Three Trustees Who Take the Chairmanship in Turn

BY L. R. BROWN
Office and Field Engineer New York State Railways, Rochester, N. Y.

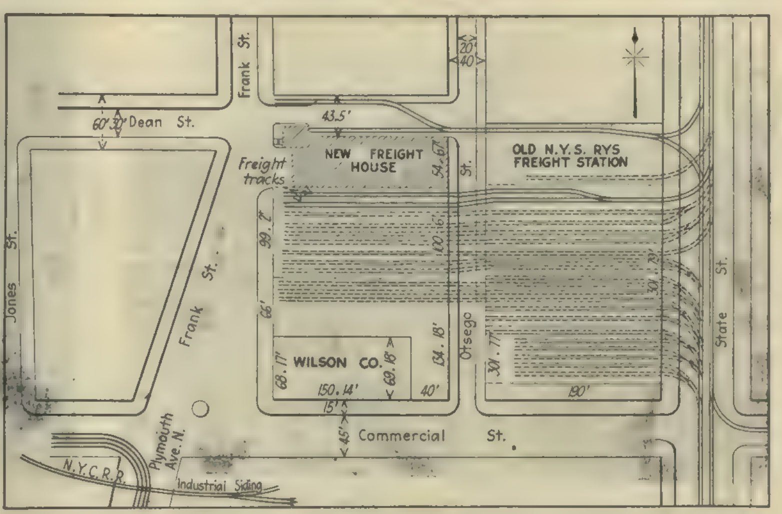
THE New York State Railways, in conjunction with the Rochester & Syracuse Railroad and the Rochester, Lockport & Buffalo Railroad, have just completed and put into operation a union interurban freight terminal. The New York State Railways previously operated electric freight service on its interurban lines between Rochester and Sodus Point and between Rochester, Canandaigua and Geneva, N. Y. The Rochester terminal was located on Otsego Street. It was small and not easy of access and business became very congested at times. The Rochester, Lockport & Buffalo Railroad operates between the cities from which it takes its name and serves also several small cities and villages located on its line. This company had previously conducted electric freight service in conjunction with the Rochester & Syracuse Railroad, with a station located near the Erie Railroad freight station on Exchange Street, Rochester. This station was about 1 mile from the station of the New York State Railways. The Rochester & Syracuse Railroad operates between Rochester and Syracuse and many small cities and villages on its lines.

These three electric railway companies entered into a ten-year agreement whereby the first cost of the terminal was borne proportionately by each, and the yearly operating cost is assigned on the basis of the tonnage handled by each during the year. Each company appoints a trustee to care for its interests in the terminal. The trustees meet once a month. One member is elected as manager for a year and thus each company has the managership every third year. B. E. Wilson, general passenger and express agent New York State Railways, is the present manager.

The new union electric freight station is located between Frank and Otsego Streets in Rochester. It is in the rear of the New York State Railways' State Street carhouse and offices and only one block from the Kent Street freight station of the New York Central Railroad. The electric freight cars have access to both sides of the terminal by means of spur tracks leading from the tracks of the New York State Railways in State Street. Teams and trucks have access to one side and one end of the freight station, with entrance on both Frank and Otsego Streets. The new building, as shown on the accompanying plan, adjoins a carhouse of the New York State Railways and the wall of this was used as a wall of the new building. Five openings were cut through this wall at convenient locations to fit the doors of the various cars and two of the carhouse tracks next to the new freight house were taken over as freight tracks. The second track can only be used "loading through" cars standing on the first

RECEIVING SIDE OF THE NEW TERMINAL

track. The location of these loading doors is shown in the construction photograph. As the cars used by the three companies are of various lengths and heights, some having center doors and others having two side doors near the ends, the openings in the walls were located by the aid of car templates so that any of these cars could load or unload next to the freight house at the same time. Pits on one of the tracks provide opportunity for inspection of the cars while in the station.



FREIGHT TERMINAL IS LOCATED CONTIGUOUS TO NEW YORK STATE RAILWAYS CARHOUSES

DURABILITY A FEATURE IN THE DESIGN

The building itself is 170 ft. long and 54 ft. wide. The outside walls are of brick. The building is one story high and has a Barrett specification tar gravel roof laid on 1¾-in. matched roof boards. The timber roof is supported by wood posts which form nine bays, the distance between posts being 18 ft. The bottoms of the posts rest on concrete piers containing cast-in dowel pins. The piers extend down to the original soil. The bottoms of the wood posts supporting the roof are protected from trucking by angle irons secured to each of the four corners. All exposed corners of brick work are protected in the same manner.

The floor of the freight house is of concrete, 6 in. thick, the surface being protected from trucking by the use of Ironite, a mechanical hardener. The entire floor was laid on a freshly made fill about 3½ ft. deep. This was done to bring the floor up to the level of cars and trucks. The fill was compacted by the puddle method. Each load of earth was spread and thoroughly soaked with water from a fire hose. The fill was made slowly while the rest of the work was going on, and the teams driving over the surface helped compact the fill. The concrete floor was the last part of the construction to be done. It was built in alternate blocks after the outside doors were hung. No expansion joints were used.

A two-story brick residence, left standing on the property, was incorporated into the freight terminal for use as an office and warmroom. This was one of nine residences which stood on the property. The others were removed to provide space for the freight terminal. The basement of the residence provides room for the heating plant and quarters for the freight handlers. The ground floor is occupied by the cashier's office and the warmroom, as well as a washroom and toilets for the men. The second floor has rooms for the billing clerks and bookkeepers and a restroom for the women clerks. A dummy waiter between the cashier's office and the billing clerk upstairs saves many steps.

The main freight room is divided into two parts by a strong slat fence. This separates the inbound from the outbound freight. Each village or city which has considerable freight traffic is allotted a portion of the floor which is properly designated by signs. Portable desks are provided near the doors so that clerks can check off goods received in or sent out of the terminal. Two sets of automatic scales are provided of five tons capacity each. These are both located in the outbound end of the terminal. The foundations of these scales can be seen in the construction photograph.

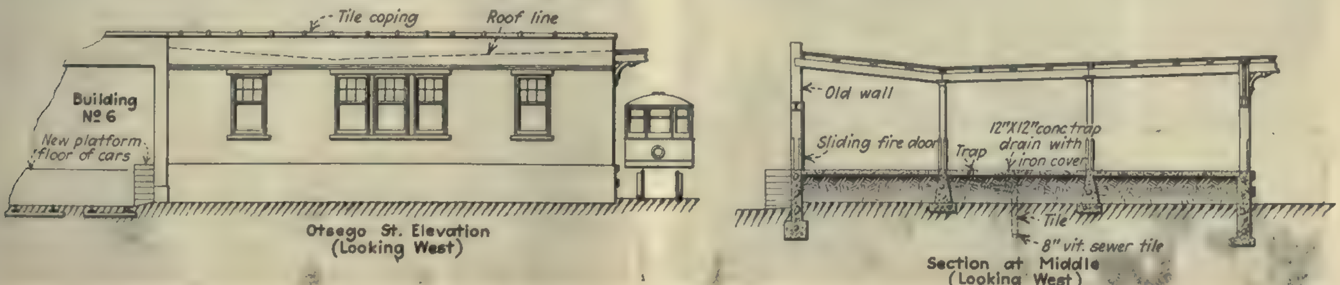
Light is admitted to the building by windows in the east end and by windows over the doors extending the full length of the north and west sides. Skylights, the use of which was contemplated in the original design, were omitted on account of expense. The building as designed was intended to be the cheapest possible, taking into consideration the appearance and use.

SOME OTHER STRUCTURAL FEATURES

For fire protection a sprinkler system has been installed to protect the freight-house offices and cars from fire. The openings between the buildings are protected by tin-clad sliding fire doors. The outside doors, which occupy the full length of the north and west sides, are of the sliding folding type, being made of parallel cypress. The stiles are two inches thick. Gas pipe guards have been erected to protect the doors from trucking when they are folded back into the open position. The doors are very easily and quickly operated.

The new union freight station is located just across Otsego Street from the old New York State Railways freight station. Electric freight cars pass through the old station to reach the new terminal, thus making it very convenient to utilize the old station as an overflow for the new station should occasion require. A photograph is shown of the old station and another of the new one taken from the roof of the old station.

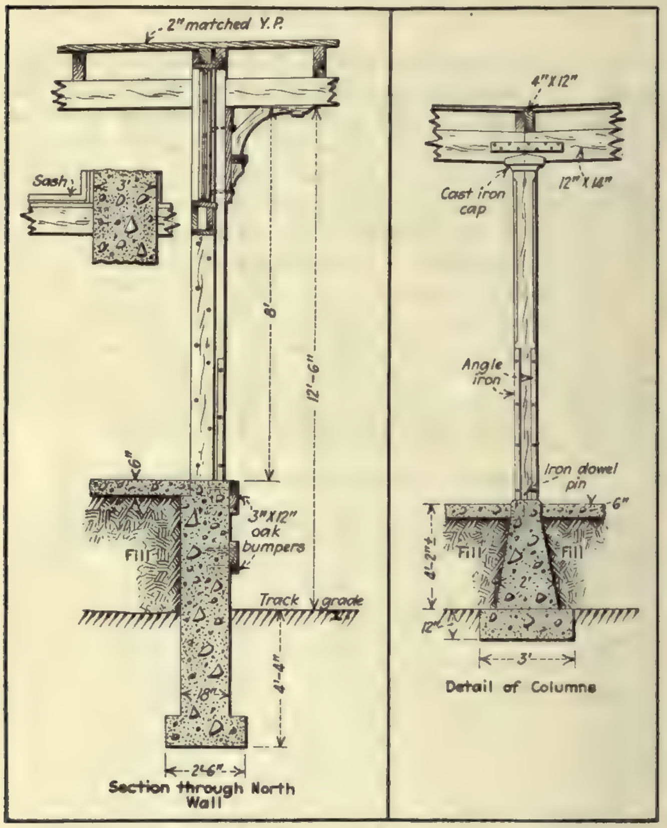
An important feature of the terminal is the large


Tile coping
Roof line
Building Nº 6
New platform floor of cars
Otsego St. Elevation (Looking West)
Old wall
Sliding fire door
Trap
12"X12" conc. trap drain with iron cover
Tile
8" vit. sewer tile
Section at Middle (Looking West)

ELEVATION AND CROSS-SECTION OF TERMINAL REPRODUCED TO SUGGEST STRUCTURAL DETAIL

A CONSTRUCTION VIEW, STATE RAILWAYS CARHOUSE IN BACKGROUND

OLD ELECTRIC FREIGHT STATION REPLACED BY NEW TERMINAL



SOME CONSTRUCTION DETAILS OF THE ROCHESTER ELECTRIC FREIGHT TERMINAL

paved area provided for the use of teams and trucks. The entire yard is paved with concrete, thus eliminating the muddy conditions which existed at the other terminals at certain times of the year. This paved area provides a space about 40 ft. wide in front of all the doors, as well as a passage between Otsego and Frank Streets. The west end of the station is set back 20 ft. from the street line, so that trucks backed up to the station will not block the sidewalk on Frank Street.

"USE FACTOR" OF BUILDING IS HIGH

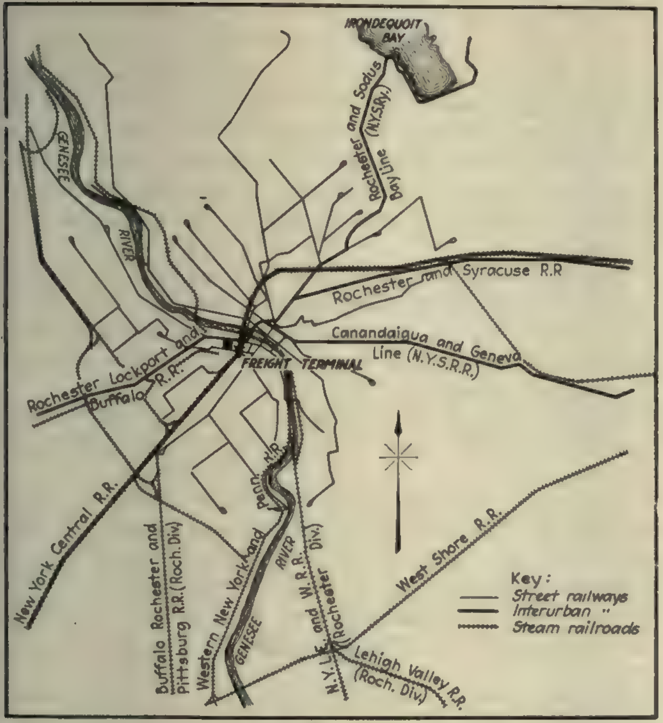
The terminal is operated on a twenty-four-hour basis, openings on the north side of building being used for teams and trucks in the daytime and for cars at night. Including the team track along the north side of the property, eleven cars can be loaded or unloaded in the terminal at the same time. This does not include the old station space between State and Otsego Streets, which will hold seven other cars. In the daytime, when there are no freight cars loading on the north side, twenty teams or trucks can back up to the doors and load or unload at the same time.

The arrangement of tracks provides for the transfer of freight with minimum amount of handling. The location of the two tracks side by side makes it possible to transfer freight direct from one car to another. The tracks on the north side of the freight house facilitate loading direct from truck to car or vice versa. The track on the extreme north side of the property provides for the "setting in" of a box car or trailer which

THIS FREIGHT HAS BEEN WEIGHED AND AWAITS SHIPMENT

TYPICAL FREIGHT SHIPMENTS READY FOR LOCAL DELIVERY may require more than one day to load or unload. The location of tracks on both sides of the building eliminates much truckway, as freight brought in on cars at night can often be left near the doors, whence it will be taken away by trucks in the morning.

This union electric freight terminal furnishes the needed link properly to provide western New York with electric freight service. Through rates are now established between all places on these lines between Syracuse and Buffalo. Trailers can be used for less-than-carload lots or transfer can be easily made, as explained, at the new terminal. It is expected that the union station will effect a reduction in the terminal costs of the companies and increase the general freight business of each of the roads concerned.


IRONDEQUOIT BAY
Rochester and Sodus Bay Line (N.Y.S.Ry.)
GENESEE
RIVER
Rochester and Syracuse R.R
Canandaigua and Geneva Line (N.Y.S.R.R.)
FREIGHT TERMINAL
Rochester Lockport and Buffalo R.R.
New York Central R.R.
Buffalo Rochester and Pittsburg R.R. (Roch. Div.)
Western New York and Penn. R.R.
RIVER
GENESEE
N.Y.L.E. and W. R.R. (Rochester Div.)
Lehigh Valley R.R. (Roch. Div.)
West Shore R.R.
Key:
Street railways
Interurban "
Steam railroads

INTERURBAN LINES WHICH CONVERGE AT NEW ROCHESTER FREIGHT TERMINAL

The plans for the terminal were prepared by the writer.

Greatest Living Engineers

AN INVESTIGATION recently conducted by the American Association of Engineers as to the relative standing of prominent engineers discloses among others the following results: Among electrical engineers C. P. Steinmetz heads the list, while Elihu Thomson, Thomas A. Edison and Alexander Graham Bell form a group following closely thereafter. B. G. Lamme, Frank J. Sprague and Bion J. Arnold are also well up on the list. First and second respectively on the civil engineers' list are General G. W. Goethals and Prof. George F. Swain, while the corresponding ratings are given to John A. Brashear* and Orville Wright for the mechanical engineers, Herbert C. Hoover and John H. Hammond for the mining engineers, and Leo H. Baekeland and W. R. Whitney for the chemical engineers.

The above ratings were made by the deans of a number of engineering and scientific schools.

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*Dr. Brashear died after the making of the canvass. Ambrose Swazey was tied with Mr. Wright for second place.

Detroit's Motor Bus System

Twenty-eight Motor Buses Being Operated on Two Routes, Having a Maximum Possible Haul of 13 Miles for a Flat 10-Cent Fare—Policy of the Company Is of a Constructive Character

DETROIT'S population of 1,000,000 was carried two and one-half times by an average of twenty-one buses during the first seven months of operation of the motor bus system established there in June, 1920. The report of the Detroit Motorbus Company for the period ended Dec. 31, 1920, shows gross earnings of $253,599 and net earnings of $20,051 after setting aside $24,310 as a reserve for depreciation of equipment and $5,688 as a reserve for injury and damage claims.

Service was started on June 11, 1920, between Grand Circus Park and the Detroit water-works, via Woodward and Jefferson Avenues, a 5-mile run, with eight buses on an eight-minute headway. At the present time twenty-eight motor buses are operating on a six-minute headway over 13 miles of street. The Jefferson Avenue route has been extended east to the Continental Motor factory (1.5 miles) and north on Cass Avenue to Amsterdam Avenue (2.5 miles). An additional service is operated via John R. Street, Piquette and Amsterdam Avenues and Second Boulevard, from the City Hall to Boston Boulevard (5 miles). This route connects with and transfers to the Cass and Jefferson Avenue route at the Amsterdam Avenue terminal.

Operation is authorized by the city of Detroit under a general motor bus ordinance approved by the City Council Dec. 26, 1917, and amended May 26, 1919, licensing the operation of motor buses on all the streets and parkways of the city except those of Belle Isle Park. The company has no franchise. The ordinance provides that any license issued thereunder shall be subject to renewal or revocation. It also provides for amendment or alteration. Under these conditions a company that was not confident of its ability to render acceptable and popular service would not be likely to undertake it.

Like any other common carrier in Michigan, the bus company is subject to commission regulation.

DETROIT MOTOR-BUS COMPANY
INCOME STATEMENT—JUNE 11 TO DEC. 31, 1921

	Actual	Per Bus-Mile, Cents	Per Cent of Total Revenue	Per Cent of Total Operating Expenses
Operating revenues:				
Passenger fares	$250,280	40.15	98.70	.....
Omnibus hire	455	0.07	0.17	.....
Advertising	2,864	0.46	1.13	.....
Total	$253,599	40.68	100.00	.....
Operating expenses:				
Maintenance of plant and equipment	$16,865	2.71	6.65	7.32
Reserve for depreciation	24,310	3.90	9.58	10.55
Conducting transportation	155,351	24.94	61.26	67.47
Traffic expense	2,171	0.35	0.85	0.94
General and miscellaneous	25,837	4.14	10.22	11.25
Reserve for injuries and damages	5,689	0.91	2.24	2.47
Total	$230,223	36.95	90.80	100.00
Net operating revenue	23,376	3.73	9.20	10.13
Taxes, license fees, etc. (a)	1,027	0.16	0.40	0.45
Income from operation	$22,349	3.57	8 80	9.68
Miscellaneous income	160	0.03	0.06	0.07
Gross income	$22,509	3.60	8.86	9.75
Deductions	2,458	0.39	0.97	1.07
Net income to profit and loss	$20,051	3.21	7.89	8.68
Passenger traffic:		Number		
Revenue	2,502,800	4.015	.....	.....
Transfer	236,005	0.379	.....	.....
Total rides	2,738,805	4.394	.....	.....
Bus-miles run	623,385	......	.....	.....
Per cent of buses in daily use	97	......	.....	.....

(a) Exclusive of federal income and profits taxes.

During the spring and summer of 1921 it is planned to increase and extend the service. The Jefferson Avenue line is likely to be extended to the city limits on the east and to have a downtown terminal at Grand Circus Park as originally. A Cass Avenue and Second Boulevard line will run from the Windsor Ferry at the foot of Woodward Avenue to Boston Boulevard. An additional service on this line starting from the ferry will diverge at the West Grand Boulevard and run west to Grand River Avenue. An additional service on the Jefferson Avenue line will diverge at the East Grand Boulevard and run north to the Packard factory. The John R. Street line will probably be extended straight north on John R. Street to Boston Boulevard. These extensions will be made possible through the receipt of forty additional buses of the Detroit low type, which can operate safely with passengers on the upper deck under the viaduct of the Michigan Central Railroad, which has vertical clearances over the streets it crosses of but 12.5 feet.

DETROIT LOW-TYPE BUS WITH LEFT-HAND DRIVE

DESIGN OF BUSES

The Detroit bus was developed by the New York Transportation Company (which owns the Fifth Avenue Coach Company of New York and controls the sale of the vehicles it manufactures) for service on streets where the overhead clearances precluded the use of the standard Fifth Avenue type. With the exception of the height, the bus is similar in appearance to the standard Fifth Avenue bus, but has a left-hand drive.

So successfully does the Detroit bus meet the special problems of low overhead clearances that the tallest man sitting on an upper-deck seat will have at least 6 in. clearance above the top of his hat while passing under the railroad viaducts. The same man standing on an upper deck could not possibly reach a railroad trolley wire at its standard height.

The bus occupies less than 3.75 sq.ft. of street space for each passenger carried and weighs only 223 lb. per passenger capacity. It can be turned completely around in a 60-ft. street without backing. The stepless platform is 14 in. above the pavement and 8 in. above the sidewalk. Route numbers are carried on roller curtain destination signs on the front of the bus and also at the right of the entrance. In winter the lower deck is heated by the exhaust from the engine and the heat is regulated by a hand valve.

On the lower deck ten stationary cross seats, with rattan coverings, provide places for twenty passengers facing forward. A bulkhead seat allows space for two additional passengers riding backward. A bright and cheerful interior is obtained by the use of 100 sq.ft. of glass and white enameled ceiling. The windows are of the drop sash type and practically convert the lower deck into an open car when it is desired in warm weather.

On the exposed upper deck, which has a capacity of twenty-six passengers, wooden slat seats, each seating two, arranged seven on the right side and six on the left, are used, due to the impracticability of obtaining a weatherproof, self-draining spring seat. Each seat on both decks is equipped with a push-button signal for the convenience of the passenger in signaling the driver at alighting points.

FARES AND TRAFFIC

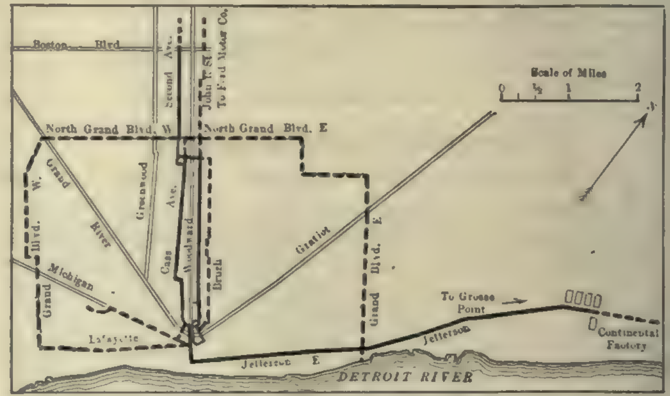
Operation is conducted under the flat fare system, with the base rate 10 cents. Free transfers are issued to connecting routes for travel in the same general direction. Every passenger is provided with a seat, and no standing in the aisles or on the platform is permitted. Smoking is allowed only on the upper deck of the bus.

Transfer regulations provide that transfers are good only to the person to whom issued, and no other, for a continuous trip on the first bus on which there is a vacant seat upon either deck under the usual conditions of time and direction.

The system of fare collection follows the "collect within" principle and utilizes the Rooke automatic register.

The traffic that has been developed by the buses is surprising. During the less than seven months of 1920 they carried 2,502,800 cash passengers and 236,005 transfer passengers or a total of 2,738,805, or at the rate of 591 cash passengers per day per bus, or 215,715 cash passengers per bus per annum. The bus mileage that was made during this period was 623,385.1. The percentage of buses owned that were in operation daily throughout the period was 97 per cent. The table gives a detailed analysis of operations and the cost of service on a bus-mile basis.

The general policy of the company has been constructive in character, aiming to supplement the street railway service rather than compete with it, and as far as possible to supply service on the thoroughfares not served by any street railway line.



BUS ROUTINGS IN DETROIT, FULL LINES SHOW PRESENT ROUTES—DOTTED LINES SHOW PROPOSED EXTENSIONS

In more than five million safety-car miles in Terre Haute, Ind., the railway company has had only six cases of motor trouble—four armatures and two fields.

Method Used in New Jersey Valuation

An Analysis Showing How the Reproduction Costs on Two Price Bases Were Determined and Used in Reaching the Value of $125,000,000 for Rate-Making Purposes—Property as a Whole Found Well Maintained — Operating Efficiency of the Physical Property and Organization Is Set at 86 per Cent

IN DETERMINING $125,000,000 to be the value of the operative physical property and business, exclusive of franchise value, for rate-making purposes of the Public Service Railway of New Jersey, Ford, Bacon & Davis, engineers employed by the New Jersey State Valuation Commission, prepared two separate reproduction-cost appraisals on different price bases. They also considered the historical cost or investment in the property since its inception. Using average pre-war prices ruling from the period between 1910 and 1915, the value determined was $88,815,887 with accrued depreciation amounting to $14,382,789, as against $189,489,560 with accrued depreciation of $32,784,505 if prices as of Sept. 1, 1920, had been used. The historical cost as found amounted to $119,150,263.

The unamortized cost of superseded property amounted to $4,701,943, while the reproduction cost of non-operative property was $502,713 at pre-war prices and $645,593 when Sept. 1, 1920, prices were used.

The outstanding securities of the railway amount to $165,066,556, divided as follows: Common stock, $83,038,000; preferred stock, $1,166.500; bonds, $79,235,016, and equipment notes, $1,627,000.

An inspection of the physical property indicated 80 per cent condition. In the judgment of the engineers the operating efficiency of the property and organization was placed at 86 per cent.

In determining the reproduction values the detailed physical inventory prepared by Dean M. E. Cooley as of Dec. 31, 1915, which had been previously checked in many details by the New Jersey Public Utilities Commission engineers, was used as a basis. Additions since that time, which were principally for rolling-stock, were taken from the company's records.

The reproduction cost new valuation made by Cooley was based upon average unit prices extending over the five-year period from 1911 to 1915 inclusive. With additions to capital from Dec. 31, 1915, to Jan. 31, 1920, the total value amounted to $88,165,858.

WHAT THE VALUATION INCLUDES

The present valuation embraces the entire electric railway system of 832.92 miles of track owned or operated under leases of 900 years or more by the Public Service Railway Company; the properties of the Riverside & Fort Lee Ferry Company; the Port Richmond & Bergen Point Ferry Company; the Peoples Elevating Company; the Jersey City Wagon Elevator; the Public Service Terminal in Newark; the property installed by the Emergency Fleet Corporation in Newark, Kearney and Camden, and the value of the tracks and overhead prior to relocation in Camden which the government has agreed to restore to its old location at the expiration of the government's use of the property. None of the property of the Public Service Railway Company is included.

TABLE I—GENERAL TRACK STATISTICS

Miles of Track Operated	Girder Rail	Low T-Rail	Total
Special work	67.84	16.48	84.32
Straight track	488.58	260.02	748.60
Total	556.42	276.50	832.92
Equivalent rail tonnage	77,452	32,987	110,439

TABLE II—ROLLING STOCK OWNED

	Closed Cars			Open Cars		
	Four Motor	Two Motor	Trailers	Four Motor	Two Motor	Total All Kinds
Double end, double truck	696	171	..	106	31	1,004
Single end, double truck	(a) 585	248	..	257	48	1,138
Double end, single truck	...	79	..	...	121	200
Safety-cars, double end, single truck	...	195	..	...	...	195
Trail cars, double truck	...	...	1	...	...	1
Electric locomotives	...	...	..	...	...	....
Service and work cars, all kinds	...	...	..	...	...	284
Total	1,281	693	1	363	200	2,822

(*a*) Includes fifty-one single-end, double-truck, four-motor cars paid for by U. S. Shipping Board Emergency Fleet Corporation but used in the operation of the Public Service Railway and to be purchased by the company.

TABLE III—ESTIMATED COST OF REPRODUCTION NEW—NON-OPERATIVE PROPERTY

(Account 404)

	Pre-War Prices	Sept. 1, 1920, Prices
Land	$341,875	$341,875
Buildings	100,552	227,556
Structural overhead costs	55,303	71,179
Property to revert (*a*)	4,983	4,983
Total	$502,713	$645,593

(*a*) Two buildings are on land owned by the railway company which is leased to others. The buildings will revert to the company at the end of the lease and the amount, $4,983, shown is the present worth of an amount of money which at 8 per cent compound interest will equal the estimated value of the buildings at the end of the lease.

TABLE IV—MISCELLANEOUS INFORMATION

	Unit	Quantity	
Poles:			
Wood	No	25,927	....
Iron	No	19,958	45,885
Cross-arms:			
Wood	No	25,569	....
Iron	No	3,525	29,094
Insulators	No	....	76,058
Strain insulators	No	....	53,938
Lightning arresters	No	....	2,071
Span wire	Ft.	....	1,698,721
Trolley wire	Lb.	....	1,824,141
Feeder wire	Lb.	....	9,850,345
Trolley cars	No.	....	39,923
Rail bonds	No.	....	160,570
Rails:			
Girder	Tons	77,452	....
Low T	Tons	32,987	110,439
Ties:			
Untreated	No.	1,294,204	....
Treated	No.	696,827	1,991,031
Stone ballast	Cu. yd.	....	682,369
Paving—Class A:			
Rectangular block	Sq. yd.	1,214,636	....
Belgian block	Sq. yd.	434,228	....
Brick	Sq. yd.	145,304	....
Wood block	Sq. yd.	119,058	....
Asphalt block	Sq. yd.	15,071	....
Asphalt	Sq. yd.	105,798	2,034,095
Paving—Class B:			
Macadam	Sq. yd.	1,076,751	....
Amesite	Sq. yd.	4,438	....
Tarvia	Sq. yd.	59,545	....
Telford	Sq. yd.	227,545	....
Bitulithic	Sq. yd.	2,244	....
Cobble and rubble	Sq. yd.	81,549	1,452,072
Total paving	Sq. yd.	....	3,486,167
Concrete foundations	Sq. yd.	....	246,637

The power generating system, including main stations, substations and transmission lines, together with certain real estate which were leased on July 1, 1910, to the Public Service Electric Company for 999 years, was excluded, as the property in question is not used directly by the railway in its operation. Federal courts have construed that such long term leases under New Jersey laws are for all practical purposes conveyances of the property. The actual investment in power stations, however, up to the time of the lease is included in the historical cost figure.

The inventory was classified according to the State of New Jersey Board of Public Utilities Commissioners' uniform system of accounts for street railways. In certain cases the value of property that was used jointly for railway operation and other purposes, such as the Terminal Building in Newark, has been included in its entirety in the account covering operative property, it being assumed that in fixing a rate base, incidental receipts from rentals of such property would be taken into account.

Miscellaneous physical property held for rent and other property which is not anticipated will be required within any reasonable period for either maintenance or operation was included in Account 404. All construction and equipment items of a special and incidental nature which could not be properly charged to any other account are included in Account 550-B "Miscellaneous construction expenditures."

The Cooley appraisal as of Dec. 31, 1915, was used as the basis for detailed inspection and measurement after being spot checked in sufficient detail to verify accuracy. Additional charges to plant since that time were obtained from the company's construction records, and verified as to character and condition by inspection. These capital additions up to Jan. 1, 1921, amounted to $1,514,260. One-man safety cars, trailer cars and service equipment totaled $1,479,342 of this amount.

Two bases of prices were used to obtain an appraisal of the property in terms of pre-war money and present-day money. The pre-war prices were generally the average of prices ruling between 1910 and 1915. Present-day prices were those current Sept. 1, 1920.

All land was appraised by real estate men. Prices fixed were based on normal market values for the highest general use. Strictly special use, such as for railway purposes, was not considered or allowed for. Locality value, the value of adjoining or neighboring land, were considered. Allowance wherever justified was also made for plottage or assemblage, continuity and special adaptability, although only bare land values as of the normal grade were used. Cuts and fills were considered as improvements.

The estimated cost of plots, abstracts, notarial fees, recording deeds, etc., as well as assessments levied by public authorities, amounts payable for construction or improvement of roads, streets, etc., were added to the appraisers' bare land value.

Overhead charges were defined as expenditures made for the work as a whole and which could not be apportioned accurately among the various inventory items.

Pre-construction costs embrace the formulation of the initial plan and interesting a group of individuals sufficiently strong to bring the project to maturity; the preliminary legal and technical studies; the securing of title and franchises; the legal and technical presentation of the project to secure financial interest, and the securing of options.

An examination of the company's books and records, previous experience in similar research for other properties of the same character, as well as recognition of the fact that in most cases when financial interest has been secured there is usually a reorganization or settlement involving a recognition of profit to the original projectors and developers, showed these costs to amount to 2.1 per cent of the reproduction costs based on present-day prices and 3.3 per cent of the reproduction costs under pre-war conditions.

The construction period was construed to begin when the financial interest had been secured. Before actual construction can begin, it is necessary to secure an ample and complete supply of materials and to negotiate many of the necessary contracts. Six months is taken as an estimate of the time necessary. To construct the whole property it was estimated would take from four to five and one-half years.

The administrative organization laid out to carry on this construction was divided into six parts, namely, administrative, legal, engineering, construction and purchasing. The allowance for administration and legal expenses was found to amount to 1.75 per cent of the reproduction costs exclusive of real estate based upon present-day prices and 2.5 per cent under pre-war prices. Real estate expenses were estimated at 3 per cent under current prices and 2 per cent for pre-war costs.

The engineering work was construed either to have been handled by a staff organized by the company or an established engineering firm. In either case the cost would be about the same for actual results. In addition the employment of consulting engineers would be necessary to perfect and insure the design of all parts of construction and equipment. The services of architects and local engineers would also be necessary. A weighted allowance of 3.5 per cent of the reproduction cost exclusive of real estate under present prices and 5 per cent under pre-war prices was used. Engineering and superintendence for the real estate under present-day conditions was estimated at 0.8 per cent, while for pre-war conditions 0.5 per cent was used.

Interest during construction was treated as the net interest accruing on construction expenditures before the property for which expenditures were made is placed in operation and as each portion of the road went into service the interest account was relieved of that portion. Interest was estimated at 6 per cent for pre-war prices and at 8 per cent for present-day basis. Funds, it was estimated, must be on hand for an average of a month and a half before disbursement. Two per cent per year was allowed for estimated bank balances.

In calculating taxes during construction credit was allowed for that portion of the road which would go into operation each year and the tax account relieved to that extent. The average amount of taxes was found to be 0.9 per cent of the reproduction cost for each set of prices.

Financing expenses cover services, expenses and reasonable profits thereon in connection with the wholesale and retail marketing of securities. Such expenses are estimated in per cent of the total funds required and the allowances were based on actual experiences of the Public Service Corporation, upon similar data determined for other companies and upon the judgment of experts in this line of business. Based on the foregoing 7.5 per cent was allowed for present-day prices and for the reproduction costs under pre-war conditions 5 per cent.

PERCENTAGE ALLOWANCES FOR GENERAL OMISSIONS AND CONTINGENCIES

Account	Way and Structures	Per Cent
504	Grading	2
510	Track and roadway labor	5
514	Elevated structures and foundations (foundations only)	10
515	Bridges, trestles and culverts	3
516	Crossings, fences and signs	3
517	Signals and interlocking apparatus	3
518	Telephone and telegraph lines	3
519	Poles and fixtures	5
520	Underground conduits	5
521	Distribution system	5
524	Stations, miscellaneous buildings and structures	3
525	Wharves and docks	5
	Equipment	
530	Passenger and combination cars	0.5
532	Service equipment	0.5
533	Electric equipment of cars	0.5
534	Locomotives	0.5
536	Shop equipment	3
538	Miscellaneous equipment	3

So far as they reflect quantities, unit prices, incidentals and contingencies, an allowance for omissions was included in quantities and unit prices. Except for the construction and equipment accounts, additional allowances have been made for general omissions and contingencies which were not covered in the quantities and unit prices. The percentages so allowed and listed above cover expenses corresponding to a contractor's carrying charge, charges made during the progress of construction, strikes on the work and delays affecting the delivery of materials or prosecution of work, omission in cases of scattered property difficult to inventory, collateral work on outside structures not now apparent, such as relocation of other pole lines, etc., and delays due to legal obstruction.

The inspection method was used to get the determination for accrued depreciation. Obsolescence was allowed only where replacement could be definitely foreseen. Obsolescence due to future improvements in the art was not considered.

INTANGIBLE ELEMENTS OF PROPERTY

The intangible elements of property, that is, the elements not represented by physical property, are represented by the company's income, the market for the securities, etc. Four elements as defined below were considered.

In determining "going value," four to five years was considered a reasonable time in which to build up the business and to perfect the organization. It was impossible, however, to determine from the records kept by the company the actual cost of developing the business. It became necessary therefore to make certain assumptions. These were based on the piecemeal plan of construction, variable rising wages, operations continually shifting, requiring changes in the amount of service for different districts. Actual expenditures incurred in carrying the organization and eliminating the weak and inefficient elements therein were merged in the operating accounts. Then, too, no record was kept of the inadequate return on investment during early operation.

Weighing these points, it was found that on the basis of present-day prices for labor and material the cost of going value amounted to 8 per cent of the reproduction cost of the physical property and based upon pre-war prices it amounted to 6 per cent.

Consolidation value is defined as the element of value which attaches to a strong unified system as contrasted with the uneconomical condition under which smaller companies operate in the same or adjacent territory. The element of value due to consolidation in the existing system is estimated by comparing its operation with that of a number of smaller independent companies. Savings due to consolidation should result in more efficient routing of cars, reduction in maintenance and fixed charges on excess trackage, reduction in the cost of maintenance of equipment by passing the work through consolidated shops in larger quantities and reduction in equipment investment. Inspection of car operations can be put under a single head, as well as way and structure maintenance. A large company has more ability to secure money usually at cheaper rates of interest than smaller companies.

Savings in the larger consolidations involving 117 companies were estimated in detail and amounted to a total of 3.65 per cent of the total cost of service. In the cases of other consolidations involving only a dozen or more companies the saving was estimated at 1.89 per cent of the cost of service.

TABLE V—ESTIMATED COST OF REPRODUCTION NEW—OPERATIVE PROPERTY, PUBLIC SERVICE RAILWAY

		Pre-War Prices		Sept. 1, 1920, Prices	
		Reproduction	Accrued Depreciation	Reproduction	Accrued Depreciation
501	Engineering and superintendence	$2,660,869	....	$4,191,732	....
502	Right of way	4,430,845	....	4,781,863	....
503	Other land	6,001,837	....	6,001,837	....
504	Grading	2,477,857	$625,887	6,091,060	$1,549,813
505	Ballast	1,360,685	160,292	2,599,673	320,497
506	Ties	1,533,631	720,584	3,634,570	1,707,062
507	Rails, rail fastenings and joints	5,381,808	1,561,918	10,237,305	2,972,485
508	Special work	2,561,894	995,542	4,937,945	1,918,866
510	Track and roadway labor	2,717,178	853,859	6,938,434	2,180,516
511	Paving	6,260,165	2,435,524	14,312,086	5,675,349
512	Roadway, machinery and tools	85,253	24,581	159,880	46,384
513	Tunnels and subways	217,867	10,893	471,145	23,557
514	Elevated structures and foundations	595,572	75,321	1,269,267	148,143
515	Bridges, trestles and culverts	1,339,031	168,452	2,662,677	313,339
516	Crossings, fences and signs	187,005	21,586	387,667	44,808
517	Signals and interlocking apparatus	202,812	57,161	458,731	129,552
518	Telephone and telegraph lines	50,791	15,198	122,939	36,797
519	Poles and fixtures	1,090,651	358,769	2,584,225	827,281
520	Underground conduits	395,056	59,215	961,581	144,142
521	Distribution system	3,431,267	579,887	6,323,816	1,069,128
522	General office buildings	2,847,529	217,003	6,259,725	477,858
523	Shops and carhouses	3,176,003	992,471	7,539,477	2,342,833
524	Stations, miscellaneous buildings, etc.	419,990	98,815	983,702	231,795
525	Wharves and docks	552,356	175,732	1,346,027	430,851
530	Passenger and combination cars	7,226,120	1,805,446	17,704,251	4,423,407
532	Service equipment	457,889	114,403	1,145,627	286,235
533	Electric equipment of cars	5,110,462	1,333,831	12,108,732	3,160,380
534	Locomotives	6,834	1,754	17,001	4,379
535	Floating equipment	773,160	537,702	2,242,164	1,559,334
536	Shop equipment	550,061	186,914	1,199,133	407,472
537	Furniture	240,405	83,932	458,919	127,092
538	Miscellaneous	124,185	54,255	188,256	82,248
546 550	Law expenditures Administration expenses	1,513,006	....	2,376,242	....
547	Interest during construction	5,301,194	....	14,558,074	....
549	Taxes during construction	619,620	....	1,236,063	....
550	Miscellaneous:				
	(*a*) Preconstruction costs	2,066,023	....	2,689,735	....
	( ) Auxiliary operation items	172,403	55,862	438,739	142,902
	(*c*) Financing expenses	3,738,400	....	11,485,100	....
	Additions to capital account	628,173	....	1,514,160	....
	Going value	4,710,000	....	13,170,000	....
	Consolidation value	5,600,000	....	11,700,000	....
	Total	$88,815,887	$14,382,789	$189,489,560	$32,784,505

NOTE—The above totals for accrued depreciation were increased by 2.63 per cent for present-day prices and by 3.75 per cent for pre-war prices, representing one-half of the structural overhead costs for engineering and superintendence and for administration and legal expense to obtain the totals shown in the table given in the ELECTRIC RAILWAY JOURNAL April 16, 1921, page 747.

Setting aside that percentage from the cost of service in 1904, following the general consolidation in 1903, gives total savings of $361,500 as of that time, which if capitalized at 6 per cent equals $5,160,000. To this should be added $440,000 covering the subsequent additions, making a total of $5,600,000.

In arriving at the element of consolidation value applicable to reproduction under present-day prices, the estimate for pre-war prices was increased in proportion to the increase in physical value as compared with pre-war prices, thus allowing only for the decreased purchasing power of the dollar.

In addition to the savings accruing to consolidation the element of consolidation value can also be evidenced by expenditures made to effect the consolidation. Expenses on account of this element were determined by considering the price paid for a given property, the cost of the physical property, and the earning power. Expenditures made to effect the principal consolidations based on these considerations was estimated to have been at least $7,300,000.

The book value of the railway power facilities turned over to the electric company under the 999-year lease of July 1, 1910, was approximately $5,169,000. This was less than the reproduction cost new of such facilities based upon prices for labor and material prevailing at the time of the lease.

During 1920 the railway company paid $3,992,000 for electrical energy furnished under this lease. This amount included an allowance for interest at the rate of 8 per cent on power facilities turned over July 1, 1910, and the actual interest paid the electric company in accordance with the lease on additions made by the electric company.

The cost to the railway company of producing and delivering an equivalent amount of energy from a modern plant was estimated at $5,000,000, thus indicating a saving through the power lease for the year 1920 of $1,119,000, which capitalized on an 8 per cent basis amounts to $13,980,000. Adding this amount to the book costs of facilities turned over to the electric company makes a total of $19,149,000 for present-day prices.

Under pre-war prices the saving through the operation of the power lease amounted to $492,000, which capitalized at 8 per cent amounted to $6,025,000. This then added to the new book cost of facilities totaled $11,994,000.

In view of the fact that this lease is between two companies controlled by the same holding company, these profits add no specific value to the lease. The potential value, however, has been given consideration.

WORKING CAPITAL

The allowance for working capital was defined as the requisite amount of materials and supplies it was necessary to carry in stock to meet the regular demands for operation and maintenance of the property. To this should be added a sufficient amount of cash to meet promptly all payrolls and bills presented.

The value of supplies carried on Jan. 1, 1921, amounted to $1,520,709. The amount of free cash on hand should equal at least one month's operating expense, which amounts to $1,860,567. Adding these totals gives $3,381,276 as the amount of working capital necessary.

The actual investment as of March 31, 1919, as determined by Mark Wolff on behalf of the New Jersey State League of Municipalities at the time of the zone fare hearings was $93,662,873. Additions and corrections were made in this figure to bring it up to Jan. 1, 1921, as follows:

Historical cost:		
Estimate of Mark Wolff as of March 31, 1919		$93,662,873
Add—Payments omitted 1893 to 1898 to B. M. Shanley account of:		
Consolidated Traction Company	$420,515	
Orange & Passaic Railway	658,000	1,078,515
		$94,741,388
Deductions—		
Account of three errors of transcription	$1,072,980	
Substitution of actual figures for estimates on costs in several cases	376,545	1,449,525
		$93,291,863
Add capital additions on books of company to Dec. 31, 1919		2,562,245
Add corrections made in overhead allowances on original estimates changed from 3.5 per cent 19.7 per cent of total expenditures, which includes overhead costs equivalent to 10 per cent on construction expenditures—April 1, 1919, to Dec. 31, 1920, to cover financing expenses and interest and taxes during construction amounting to $256,224.		14,862,840
		$110,716,948
Less $2,000,000 paid railway on assumption of power lease plus correction error of $123,315		$1,876,685
Total historical cost		$108,840,263
Add intangible values not shown on books—		
Going value	$4,710,000	
Consolidation value	5,600,000	10,310,000
Total value definable as historical cost		$119,150,263

SUPERSEDED PROPERTY

The value of superseded or abandoned property, not including salvage of the existing railway company and its predecessor companies prior to the end of their useful life, amounts to $4,701,943. An itemized list of this property follows:

Horse cars, cable, dummies, buses, etc.		$2,620,000
Subsequent to electrification:		
Track	$652,064	
Power plant equipment	344,097	
Distribution system	49,926	
Car and equipment	652,673	
Abandoned track	68,479	1,767,239
Total		$4,387,239
Fare zone expense		314,704
Total		$4,701,943

An analysis by accounts on both reproduction price bases follows, together with other pertinent information concerning the physical property owned by the company.

Avoiding Transfer of Surety Bonds

IT IS now possible to bond the position instead of the individual employee. This plan of bonding all responsible positions was recently entered into by L. T. Hixon, auditor Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., with the result that the annoyance of having to transfer a bond from one person to another whenever there is a change in employees is eliminated. The company simply takes out a blanket bond, covering all bonded positions listed in an attachment made a part of the bond, for the amount specified for each position. The portion of the bond covering any particular position may be discontinued, or the amount covering a new position added on, at any time by deducting or adding the corresponding amount to the rate. This type of surety bond, which is understood to be a new development of the service of the National Surety Company, is said to be very liberal in character and to be available at practically the same rate as the old type individual bonds. The blanket bond is simply renewed yearly and that is about all the attention required.

Don't Hate Your Customers

A Talk to the Platform Men of Georgia Railway & Power Company by Its President

Preston S. Arkwright

Delivered March 31, 1921

I HAVE often wondered what you motormen and conductors think of the work you are doing. You get up early in the morning, many of you before day, frequently in the cold of the winter—you have done it many days before. You go down to the barn, get out your car, same car you got out yesterday, take it out on your route, over the same old street you ran on yesterday, and the day before that. You turn on and off the current, put on and off the brakes, running along a familiar street that you have run on many a time before, to the end of the line. You pick up the controller handle, walk through the car to the other platform, then run back over the same route to the other end of the line. Then you pick up the controller handle, walk through the car to the other platform and come back again.

The conductor rides with you on the back platform, ringing the bell for you to go, ringing the bell for you to stop, calling out the same old streets, when he calls them out at all. And so you go, five, seven, nine and eleven hours every day, day after day, month by month, year on year, in the rain, in the cold, in the sleet, Sundays, holidays, Christmases, finally reaching home again, late in the night, some of you in the early hours of the next morning. Oh! the dreary monotony—if you think that way about it.

Even at that it's no more monotonous than most other jobs.

How would you like to be a bookkeeper, perched on a high stool making figures in books all through the day, day after day and year after year, seeing nothing but figures, engaging in no activities of any kind, simply recording figures of the results of work that other men do?

How would you like to be a mechanic turning threads on bolts, doing nothing else but this, shut up in the shop all day, just turning threads on bolts all the time, day after day?

YOUR JOB IS WHAT YOU MAKE IT

How would you like to run an elevator, up and down the shaft, seeing nothing of the outside, just up and down the same shut-in shaft all the time. I know a man who does this very kind of work and he is the happiest and most cheerful man I know. He runs the elevator in this company's own office building. He makes it his business to make things brighter for everybody that works in the building. You really ought to go up and take a lesson from him.

As I say, if you think that's what your job is then that's what it is, and if you let your mind dwell on the monotony of it then you will not only never amount to very much at it, but it will drive you crazy some day.

If you'll take the right view of it you'll find your work altogether different from this. You are furnishing transportation service for a whole city. We people of Atlanta are very proud of our growth from a little crossroad village reduced to ashes in the Civil War to a city of over 200,000 inhabitants. This couldn't have been done without you—you made this growth possible. You've got more right to be proud of this city's growth than any other single enterprise in it. You've taken the greatest part in bringing it to pass.

We are very proud of the Candler Building, for instance, and the other sky-scraping office buildings that mark out the skyline of the town. The people who built them took especially great pride in them, so much so that they gave them their names; Candler Building, Hurt Building, Grant Building, etc. These buildings couldn't exist without the work that you do. You transported the mechanics who put them up, you bring back and forth the tenants that occupy them. So you have had a part in the building of them. Your work entered into it.

RAILWAY MEN HELP ALL BUSINESSES

We are very proud of our fine churches. Atlanta has an unusual number of fine churches, with eloquent preachers and large Sunday congregations. These churches couldn't exist in the numbers they do except for the work that you are doing. There would be no congregations for eloquent preachers to preach to if you didn't bring them in. Why, the very reason you can't go to church yourselves is in order that there may be congregations for churches to hold.

You bring the teachers and the children to the schools. You are helping to educate the children of the community. They couldn't come to the schools except for the work that you do. So that your work, in part, is the education of children.

Mr. Howard recently erected a very fine theater that's an ornament to the city. He is very proud of his theater, as he has a good right to be. The whole city of Atlanta takes pride in pointing to the theater Mr. Howard built. You helped to build this theater. You brought the mechanics to the job, you bring the audiences to see the pictures. There couldn't be any theater without the work that you do. There wouldn't be enough people here to sustain it, and they couldn't get to it except for your work.

You take the workmen to the shops maintaining the equipment that runs on the railroad. You run our cars all night taking the train crews to and from the railroad yards, and you bring the passengers to and from the stations. You have a part in the transportation system of the country.

There are many beautiful residence suburbs around Atlanta. There are thriving, growing, prosperous suburban towns, such as Decatur, East Point and College Park. Where would they be but for the work that you do? People couldn't live in the suburbs. They would be huddled in dark, unsanitary, congested tenement houses except for the work that you do.

So all of the activities of the community, its entire prosperity and well-being and growth depend on the basic fundamental service that you are doing. You are not simply turning controller handles and ringing bells. You are making possible the city and all of its activities and you have a share in the accomplishment of everything worth while that anybody does here. This is why you have to get up in the morning before anybody else. This is why you have to stay at work until everybody else has gone to bed. This is why you work on Sundays, holidays and Christmases. There couldn't be any other work in a city of this size but for your work and there wouldn't be any Sundays or any holidays or any Christmases that people could enjoy.

You have got a right to be proud of the work you do. There is no other so necessary, so useful or so valuable.

I don't know why it is, but I think it is true some people look down on street car men. I don't know what the cause is. Maybe its a hangover from the days when we drove a mule; or because our transactions are in little money; or because we're so poor.

Perhaps we are responsible for it ourselves. I think we have had a low estimate of our work and a poor opinion of ourselves. Nobody is going to think any more of us than we think of ourselves, that's sure. If we think we are common trash, then other people are going to think we are common trash, and common trash we are and will remain. So, above all, have a good opinion of yourselves and a good opinion of the work you are doing. Take a pride in it.

YOU HAVE A POSITION OF RESPONSIBILITY

This company has confidence in you and trusts you. It puts in your charge the car, which is pretty valuable, costing from $5,000 to $15,000. It trusts you with its money. It trusts you with its responsibility for damages. It trusts you with its reputation.

The public has confidence in and trusts you. They trust their own lives and safety to your care. They put their wives and little children in your charge, confident not only that you will save their persons from injury but will protect them from all harm.

You have a position of trust and responsibility and are performing a work of great importance.

Don't go at it just as a temporary or despised job to make a living out of. If you feel you've got to eat to live, that you've got to make a little money to eat and that's why you do this work you are not going to get any happiness out of it and nobody is going to have any respect for you.

Sometimes we think the public is unfair and unjust to us. At times we are apt to believe they are our enemies. I won't let myself think that and don't you let yourselves think that. It isn't true. They are not our enemies, but whether they are or not don't think that they are. If you believe that the public are your enemies then you are going to be an enemy to the public, and if you feel that way about it, or if I feel that way about it, we are unfit to stay in this business. We are unfit to serve people if we are unfriendly to them.

These people are your customers. You are furnishing transportation for pay. They are paying to ride on your car. *Don't hate your customers.* If you were running a grocery store or a dry goods store or a clothing store would you hate a person who came in to buy things that you sold? Now you *are* running a store. You've got charge of the car. You want people to ride with you. You want them to pay to ride with you. You ought to feel friendly with them when they do ride with you. Show your friendliness to them. Be glad to have them get on your car. Have a spirit of welcoming them. If you will show friendliness to them they will show friendliness back to you.

I have never myself been discourteously treated by a motorman or conductor. I have never witnessed discourteous treatment by a motorman or conductor of any other passenger. As a matter of fact I have very rarely been discourteously treated by anybody. Generally I think it is our own fault when we are discourteously treated. I know that some motormen and conductors do treat passengers discourteously. Sometimes I think it is due to the fact that some passenger regards the motorman or conductor as a menial servant. He shows this in his treatment and naturally you resent it. Sometimes you have got a chip on your shoulder and you take offense when no offense is intended, or you've got a grouch and you take it out on the passenger. Naturally he comes back at you.

COURTESY MUST BE INSTINCTIVE

Be considerate of passengers. This doesn't mean that you've got to apologize for living or that you must adopt a cringing attitude. It simply means that you are to put yourself in the passenger's place and treat him in the manner you would like to be treated by him. I am not talking about rules of etiquette. Pretense of good will or veneer of manner or slobbering over people is not going to get by. You've got to have the right spirit about it. You've got to like the work and want to do it properly in order to do it right. If you will get the right spirit all forms and rules of politeness will take care of themselves.

You run these cars every day and a lot of the same people ride with you day after day. You know them. Show that you know them. Learn their names, speak to them by their names. There is nothing that flatters people more than to be recognized and called by their names.

You come in contact with a great many people. This company transported about 95,000,000 passengers last year, or about 260,000 a day. In the early morning you meet the mechanics going out to construction jobs; you carry the people to the mills and factories and workshops; the clerks and business people and sales people to the offices and stores and business houses; you bring in the school teachers and the children to the schools and colleges; then come the women to shop in the stores; you carry people all day long on their various missions of business or pleasure or social intercourse. In the afternoons here come your passengers trooping back from the factories, the mills, the buildings, the shops, the schools, the stores and the offices. You bring the husband back to the wife at night and the mother back to the children. You reunite the families at home. You bring them out again to the amusements in the evening. You've got a part in all their various activities. Not only this but your treatment influences their happiness and the character of their work.

If you are grouchy in the morning you pass the grouch on to the men and women who go into the factories, the mills, the shops, the schools, the offices or the stores. You spoil their day. They pass on the grouch they have got from you to the people they come in contact with. If you pass your grouch on to the returning passengers at night they pass it on to the home circle. If you are cheerful and happy you will better the work and the lives of all of these people you transport and all of the people they come in contact with. Nobody made us engage in this work, nobody keeps us in it against our will. If we don't like it let's get out of it. If we stay in it let's be happy about it.

You owe it not only to yourselves and to the company, but you owe it to all the other men in this business with you to have the right attitude and spirit toward this work and to conduct yourselves so as to deserve the respect and good will of the public you serve.

Sometimes in an organization this large a dishonest man will creep in. The passengers notice this man knocking down fares. They immediately say that all street railway conductors are damned thieves.

Sometimes the motorman or conductor will be uncouth and rude or even insulting, we'll say, to some lady passenger. The passengers who observe it will say that all motormen and conductors are boors.

Whatever one motorman or conductor does reflects on all the other motormen and conductors. So not only get the right attitude yourselves but interest yourselves in seeing that all the others have the right attitude. If there are those among us who are not fit to be here let's run them off. Let's raise the public's estimation of the street car man.

If we have respect for ourselves, the proper appreciation of the work we are doing, and the right attitude toward our customers, we will deserve the respect of the public and their co-operation and support. And when it comes to pass that we shall get them—as it surely will—how happy we shall be.

British Railway Electrification Situation

Standardization of System and Equipment Recommended—Electrification Advocated as Most Economical Method of Reducing Terminal Congestion and of Increasing Capacity of Suburban Lines

IN ENGLAND, much more than in the United States, it is realized that if the electrification of the railways is to be undertaken on a large scale some standardization of system and equipment will be necessary. A great step in the direction of uniformity was made by the recommendation last year of the Ministry of Transport, in the opinion of London *Engineering*, that direct current at 1,500 volts should be generally adopted for the electrification of the British railways. It is to be hoped that this decision will put an end to the battle of the systems. Anyway, a reasonable decision is better than none at all.

Sir Philip Nash, in a paper recently read before the Institute of Transport, sums up briefly the British situation in regard to electrification. It appears, he said, to be taken for granted that the general replacement of steam locomotives by any system of electric traction on the trunk lines of England is far beyond the range of practical policy at present. The chief point for immediate consideration is the extent to which railway operation would be benefited by the electrification of suburban lines and large city terminals. There are also certain cases where special conditions of the line or of the traffic may indicate electrical operation to be best, but, generally speaking, the center of interest lies with suburban passenger traffic.

At the same meeting, Sir Herbert Walker, in advocating further electrification, said that the traffic on the electrified portion of the London & Southwestern Railway had increased from less than half a million passengers a week in 1915 to more than a million per week today. During the same period the operating costs of the electrified lines had increased by only 100 per cent, although the corresponding cost of steam-operated lines had increased by 200 per cent.

A somewhat similar story was told by Sir William Forbes with respect to the Brighton lines. Electrification had enabled the mileage run to be increased by 150 per cent with an increase of 200 per cent in earnings. The financial result had been a return of more than 15 per cent on the capital spent in electrification. The company was putting forward proposals at that time for the electrification of the Brighton main line, although the return on the fresh capital required for this conversion would be but 6 or 7 per cent.

The real factor which is doing more than anything else to keep the question of electrification strongly before the English railway companies is the ever-increasing difficulty of handling suburban, and especially terminal, traffic with steam-drawn trains. It is said that 1,200 trains per day enter and leave Liverpool Street station, London, and in spite of capable organization on the part of the railway officials and good humor on the part of the public, the conditions at times have been almost intolerable. The traffic has outgrown the facilities of the station, and the experience of the railways like the Southwestern shows that many more passengers are ready to travel if a sufficient number of trains is provided. Electrification may be costly as a solution for this difficulty, but when the only alternative is the enlargement of the whole station and the duplication of track and platform, the installation of electrical equipment may be decided upon merely as the lesser evil. Moreover, the incidental advantages of electric operation at terminal stations in cities are by no means negligible.

In regard to the general railway situation in England, the lines are in a run-down condition. A recent report made to settle the accounts between the government and the roads deals largely with the arrears of maintenance of normal wear and tear and replacement of stores. No less than 2,100 fewer locomotives were given heavy overhauls in 1919 than in 1913, though the light repairs to keep these engines at work numbered about the same for these years. Heavy repairs on other equipment, such as coaches and freight cars, were in a like proportion. This condition seems to point to the fact that though the stock was kept running, it was yet decidedly behindhand in upkeep.

Capital expenditure, which for many years before the war used to run to about £10,000,000 per annum, amounted to only £12,500,000 altogether between 1913 and 1919 for Great Britain and £700,000 for Ireland. The total mileage of the railways of the country in 1919, reduced to single track, was 56,000, about 800 miles more than in 1913, the increase being nearly all in sidings.

The most noticeable item, in the report mentioned above, under the heading of "Modes of Traction," is an increase of 2,732,000 engine-miles by electric traction due to the improved electric services.

Machine Sells Gum to Railway Passengers

Novel Vending Device Proves Profitable—Its Use Brings Out Fact that One Passenger in Twenty-five Will Buy 5-Cent Packages of Gum on Cars

SELLING gum to street railway passengers is a new pastime, but it is being done with success in Little Rock, Ark. Two or three years ago, J. H. Mann, Jr., of Pine Bluff, Ark., conceived the idea of building a machine to sell a standard 5-cent package of gum, rather than the 1-cent pieces so frequently sold. In wondering where to place such machines, it occurred to him to place them on street cars. A machine was developed, and a number of them were tried out experimentally for several months on some of the cars of the Little Rock Railway & Electric Company. Finally a satisfactory foolproof machine was evolved. It is designed to lock against the depositing of a coin if the machine is empty, and also to prevent the insertion of a blank or slug.

INTERIOR OF A CAR WITH VENDING MACHINES PLACED ON WINDOW POSTS

For more than a year, about 1,200 of these machines have been in successful operation on the cars in Little Rock. A demonstration was made on ten cars of the Dallas Railway which resulted in a contract for the installation of about 3,000 machines on the Dallas cars. Arrangements have been made for a test run at Knoxville, Tenn., and several other systems at this time are considering having demonstrations made.

The statistics of the past year in Little Rock are of interest. An average of forty-eight cars were equipped during the year, and on these a gross business of more than $27,000 was recorded. From this, of course, the number of 5-cent sales could be calculated and when this number was compared with the total number of passengers riding on those cars it was found that 4 per cent of all the cash-fare passengers riding on the cars so equipped had purchased gum.

The proposition which the manufacturer makes to the railways is to pay them a percentage of the receipts for the privilege of installing the machines in the street cars.

These vending machines are manufactured and distributed by the Transit Vending Machine Company, Pine Bluff, Ark., and another corporation, the Transit Sales Company, operates them. The operating company maintains the vending machines, fills them at night and extracts the coin when the cars come into the carhouse. On a basis of 10 per cent of gross receipts to the railway, the manufacturer estimates that a railway company operating 100 cars might expect to receive from this source a revenue of approximately $7,500 a year.

More recently, the machines have been loaded with mints of the "Life Saver" variety, which seem to sell as effectively as gum. The machine, which weighs 3 lb., is built of steel. It is bolted to the posts between car windows.

Wages on the Steam Railroads

SO MUCH has appeared in the daily papers in regard to hearings on steam railroad wages that an official statement by the Association of Railway Executives is welcome. This is given in Table II and shows the figures relating to representative classes of railway employees under "national agreements," with the increase in number of these employees and increase in compensation. The increase in the number of men employed is largely due, in the opinion of the Association of Railway Executives, to rules and working conditions which reduced the output per man and were introduced while the railroads were under government control.

TABLE I—PERCENTAGE INCREASES OVER 1914 OF WAGES OF STEAM RAILROAD EMPLOYEES AND COST OF LIVING

Year	Per Cent Increase in Average Wage Over 1914	Per Cent Increase in Cost of Living Over 1914
1915	1.83	2 (Dec.)
1916	9.31	15 (Dec.)
1917	23.04	32.2 (Dec.)
1918	73.89	69.3 (Dec.)
1919	81.74	93.5 (Dec.)
1920*	121.32	113 (June)
1920†	134.07	94.5 (Dec.)

* Before wage award. † After wage award.

The statement made by the Association of Railway Executives also includes a table of increases in wages since 1914 with percentage increases in cost of living as reported by the National Industrial Conference Board and by the Bureau of Labor. These figures are shown in Table I.

TABLE II—SHOWING INCREASE IN NUMBER AND PAY OF REPRESENTATIVE CLASSES OF STEAM RAILROAD EMPLOYEES UNDER NATIONAL AGREEMENT

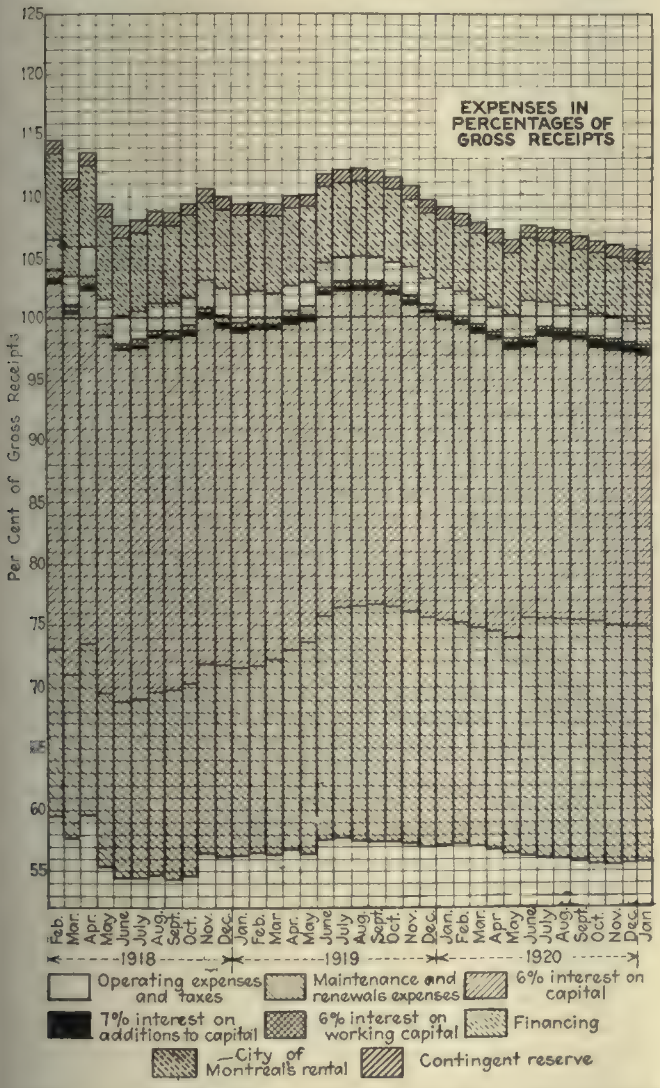
Class of Employees	Number in Service 1917	a 1920	Increase 1920 Over 1917, Per Cent	Average Annual Compensation, 1917	b 1920	Increase 1920 Over 1917, Per Cent
General foremen—M. E. dept	1,549	1,859	20.0	$1,661	$3,039	83.0
Gang and other foremen—M. E. dept	18,043	25,488	41.3	1,352	2,786	106.1
Machinists	41,112	64,861	57.8	1,394	2,382	70.9
Boilermakers	12,931	20,504	58.6	1,425	2,473	73.5
Blacksmiths	8,115	10,807	33.2	1,258	2,237	77.8
Painters and upholsterers	11,087	12,223	102	950	2,029	113.6
Electricians	9,564	14,460	51.2	1,030	2,335	126.7
Air brake men	5,904	8,064	36.6	1,086	2,350	116.4
Car inspectors	19,661	26,349	34.0	1,141	2,425	112.5
Car repairers	66,531	89,239	34.1	993	2,116	113.1
Other skilled laborers	52,989	59,733	12.7	1,065	2,229	109.3
Mechanics' helpers and apprentices	86,021	129,757	50.8	822	1,638	99.3

a First quarter, 1920. *b* July wage award included for twelve months.

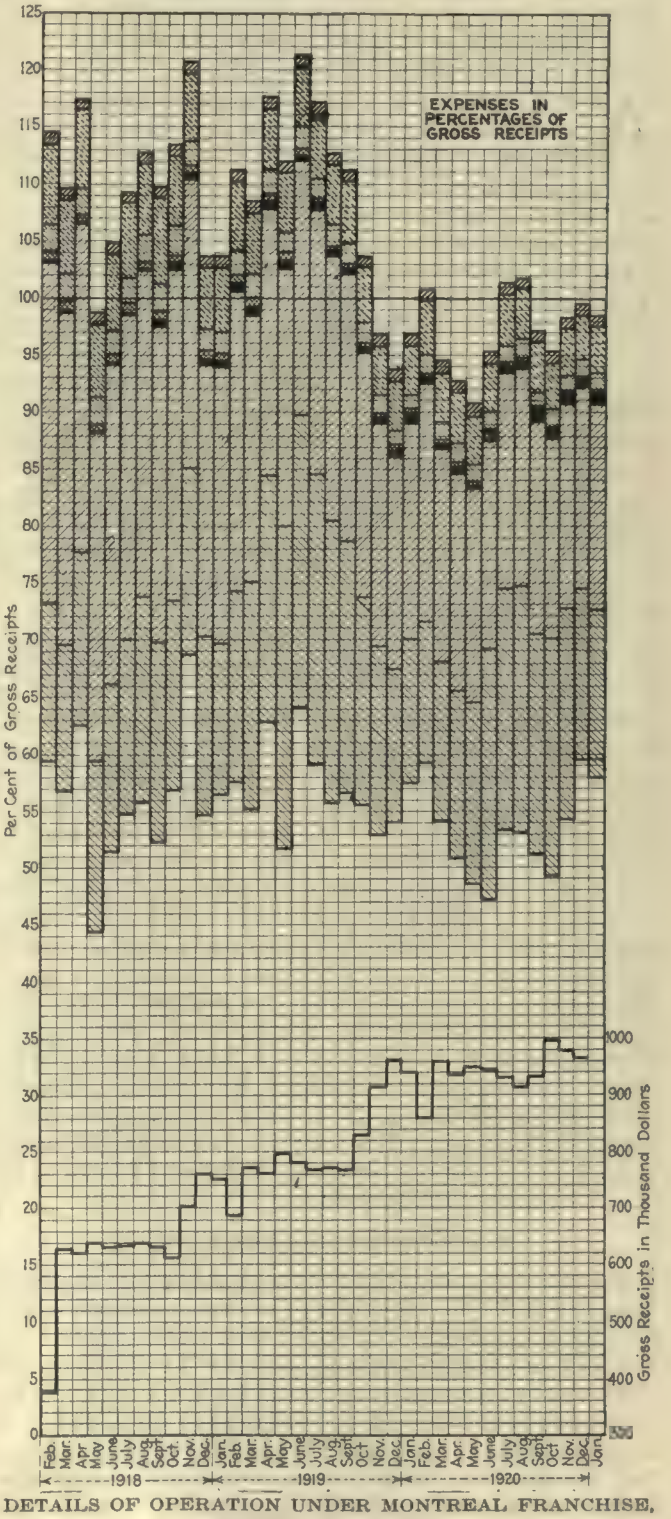
Service-at-Cost Results in Montreal

AT THE Ottawa convention of the Canadian Electric Railway Association, held Jan. 31 and Feb. 1 and covered in the issue of this journal for Feb. 5, Col. J. E. Hutcheson read a paper on the results secured under the service-at-cost franchise in Montreal. He exhibited some charts, two of them in colors, which showed the data in concrete form, these charts having been prepared for the Montreal Tramways Commission. The charts were not available for publication at the time, but arrangements to this end were made later and the data were brought up to a considerably later date than those shown in the convention. For the reader's convenience the graphs have been combined to render them more readily comparable and they are reproduced on this page.

In both charts the expenses are itemized under eight heads, the percentages being laid off one above the other in the following order: Operating expenses and taxes, maintenance and renewal expenses, 6 per cent interest on capital, 7 per cent interest on additions to capital, 6 per cent interest on working capital, cost of financing, rental due city of Montreal and contingent reserve. For convenience these are expressed in terms of gross receipts, the actual monthly values of which, to January, 1921, are given in the right-hand column. Referring to the right-hand chart, it will be noted that since November, 1919, the gross receipts have usually exceeded the expenses, so that a substantial reduction in the deficit was made during 1919. This deficit was accumulated while the actual authority of the commission to regulate fares was being determined in the courts. Colonel Hutcheson stated in his paper that the earnings per passenger were as follows: Feb. 10 to Sept. 30, 1918, 4.09 cents; Oct. 1, 1918, to Oct. 31, 1919, 4.80 cents; Nov. 1, 1919, to Aug. 31, 1920, 5.85 cents; Sept. 1 to Nov. 30, 1920, 6.09 cents.



CUMULATIVE EXPENSES UNDER MONTREAL FRANCHISE ITEMIZED, EXPRESSED IN PERCENTAGE OF CUMULATIVE GROSS RECEIPTS



DETAILS OF OPERATION UNDER MONTREAL FRANCHISE, MONTH BY MONTH

At top, itemized expenses expressed in percentage of gross receipts. At bottom, gross receipts in dollars per month.

American Association News

EXECUTIVE COMMITTEE DECIDES AGAINST EXHIBITS AND WILL ANNOUNCE CONVENTION CITY SHORTLY—APPOINTMENT OF NEW SECRETARY POSTPONED PENDING REPORT OF COMMITTEE ON PLAN AND SCOPE—NATIONAL ELECTRIC RAILWAY DAY TO BE CELEBRATED MAY 4

Executive Committee Holds Important Meeting

Settles Question of Convention and Will Make Study of Organization of Other Associations Before Appointing Secretary

AT A MEETING held in New York on April 16 the executive committee of the American Electric Railway Association decided to appoint a committee to study carefully the needs of the association and of the industry so as to make the association of greater benefit to all of its members than it has been in the past. The opinion was generally expressed that at this time and before a successor to Secretary Burritt should be appointed it would be most desirable to make such changes in the organization as might adapt it better to efficient work and to get such suggestions as might be available from the working of other national associations of somewhat similar character. For this reason the appointment of a successor to Mr. Burritt was postponed, pending the report of a new committee of twelve, whose selection was left to President Gadsden. At the same meeting it was decided not to have exhibits at the convention this year, but no definite decision was reached on the place for the convention.

The meeting was held at the office of the association and the members of the executive committee in attendance were:

President P. H. Gadsden, Philadelphia; Vice-Presidents Britton I. Budd, Chicago, and C. D. Emmons, Baltimore. Members of the executive committee, E. F. Wickwire, Mansfield; H. R. Mallison, Montreal; J. N. Shannahan, Hampton; W. H. Sawyer, East St. Louis; R. P. Stevens, New York; W. G. Gove, Brooklyn; John J. Landers, York, Pa. Past-Presidents W. Caryl Ely, New York; T. N. McCarter, Newark; Charles L. Henry, Indianapolis; L. S. Storrs, New Haven; John J. Stanley, Cleveland; C. L. Allen, Syracuse; George H. Harries, Omaha. Others in attendance included Frank W. Frueauff, New York; M. B. Lambert, Pittsburgh; Joseph K. Choate, New York; J. G. Barry, Schenectady; James H. McGraw, New York; S. M. Curwen, Philadelphia; Henry R. Hayes, New York; B. C. Cobb, New York; M. R. Boylan, Newark; H. G. Bradlee, Boston; J. D. Mortimer, New York; E. C. Faber, Chicago, and A. M. Robinson, Philadelphia.

Audit Practically Completed

President Gadsden opened the meeting by declaring that the audit of the accounts of the association had now been practically completed and he is anxious to have those in attendance as well as the members at large understand exactly what had been found and what was being done to avoid any defalcation in future. He explained that it has been the custom of the association for the past fifteen or twenty years to have the books audited in the fall of each year by members of the auditing department of the Public Service Railway of Newark, N. J. When the time came for the audit last September, the auditors were requested by the former bookkeeper of the association, W. O. Gibson, to wait so that the books could be written up. Several other attempts were made to conduct the audit, but an excuse of one kind or another was made by Gibson in each case. When a start was made, it was found that the books had not been written up since June. President Gadsden was immediately notified by telephone, and further examination by the auditors showed that there had been defalcation. When confronted by the evidence, Gibson admitted that $31,000 had been taken. The plan was that when he wanted money he would secure the signature of the secretary, who had perfect confidence in him, to a bank voucher and then would make no return of the voucher. The largest amount taken on any single voucher seems to have been $5,200, and the evidence at hand indicates that the defalcation began about August, 1919.

President Gadsden said that after consulting with several members prominent in the association and near at hand he secured the arrest of Gibson, who is now out on $15,000 bail. Up to this time no evidence has been found that any one else is criminally involved in the case, and Mr. Burritt, the former secretary, has been actively assisting the auditors. The prosecution of Gibson is in the hands of Carl R. Miner, an attorney connected with Hodenpyl, Hardy & Company, and the evidence so far indicates that the defalcation is between $40,000 and $50,000. It is possible that some of this may be got back from the defaulter.

Work of the Association Will Not Suffer

Fortunately the finances of the association, according to President Gadsden, are such that it will not actually suffer so greatly from the defalcation as might be expected. The reason for this is partly because of the increase in dues adopted last year and partly because with the higher fares prevalent on most properties and with the dues based on a percentage of the receipts, the amounts received have considerably exceeded the expenses of the association. Economy will have to be used, but no assessment will be required, and it is possible that with economical operation the rate of dues may be reduced next year. Mr. Gadsden added that he considered before this disclosure that the railways had run through the gamut of adversities, but this trouble certainly capped the climax. Nevertheless, he thought that the members might feel that the motto of the Salvation Army applied to them, namely, that a railway man may be down but he is never out.

As regards the immediate future, the association with the cash on hand and receipts expected during the rest of the year will have resources of about $100,000, and expenses of about $77,000, leaving a balance of between $22,000 and $23,000. This does not include, however, any amount for the salary of a secretary who might be appointed. He did not believe that the work of the association would be embarrassed in any way provided the president should be authorized to borrow on notes a sum not to exceed $10,000. In regard to bonds, he explained that the bookkeeper was under a bond of $2,000 and the secretary under a bond of $20,000, but owing to some unexplained reason these policies had been allowed to lapse. The policy for $20,000, however, did not lapse until December of last year, and most of the defalcation had occurred before that date. Mr. Gadsden then said that in the emergency he had asked Mr. Welsh, at that time statistician of the association, to act as secretary pro tem. Mr. Welsh has performed the duties of this office in a very satisfactory way and the thanks of the association were due to him.

APPOINTMENT OF SECRETARY POSTPONED PENDING REPORT OF PLAN-AND-SCOPE COMMITTEE

Taking up then the question of the appointment of a secretary, Mr. Gadsden said that seven or eight names of possible candidates had been presented by members, but said he himself had no one particularly to recommend. He felt that in any such selection the president of the association should not take a preponderating part, as the president is a temporary officer only, whereas the secretary, if he is the proper man, will guide the affairs of the association long after the president has retired to the ranks.

Committee on Plan and Scope of American Electric Railway Association Announced by President Gadsden April 19, 1921

President: P. H. Gadsden.....Philadelphia

Past-President: John H. Pardee, New York

Vice-Presidents:
Britton I. Budd..............Chicago
C. D. Emmons..............Baltimore

Members of executive committee:
R. P. Stevens..............New York
W. H. Sawyer..........East St. Louis

Membership at large:
John G. Barry...........Schenectady
H. V. Bozell..............New York
H. G. Bradlee.................Boston
Harlow C. Clark............Newark
B. C. Cobb.................New York
Myles B. Lambert.........Pittsburgh

Nevertheless, while he had no candidate for the position, Mr. Gadsden said that he had very positive views of the type of man who should be selected. In his opinion the time has come when the association should be set on a higher and broader plane of usefulness. Up to three or four years ago it was only a small organization with a budget of from $30,000 to $40,000. Everybody knew most everybody else, and the secretary's office was a sort of social headquarters for visiting railway men. This was all right so far as it went, but in the future the office should be a place where much more effective work should be done for the benefit of the industry. The future secretary should be a leader, a man with vision and personal force, some one to do the thinking for the industry as a whole.

The president said he thought the association could learn much from the practice of the National Electric Light Association and the American Gas Association, both of which were doing work largely along the lines which he had in mind. Then he asked whether it would not be wise to reorganize the association along such lines and then look around to see who would manage it.

In response to Mr. Gadsden's request for different members to express their opinion there were remarks from Messrs. McCarter, Budd, Bradlee, Curwen, Sawyer, Mortimer, Stanley, McGraw and Cobb, all of whom expressed themselves in agreement with the sentiments expressed.

The motion was then made and carried that the president should be authorized to appoint a committee of twelve to make a study of the needs and opportunities of the association, to take as long as was needed and to report its recommendations with suggestions as to the name or names of men qualified to carry out the work of directing the work of the association. It was decided also that this would include the future publication policy of the association as regards *Aera*. Mr. Gadsden then said that he was sure that the committee would welcome suggestions from the members of the association as to ways in which the work of the association could be improved or desirable changes in the plan and scope of the organization of the association. He said he would not announce the membership of the committee at that time, but did so on April 19. The names appear in the panel on this page. Mr. Gadsden then said that he had asked the auditor of the association, Mr. Boylan, to prepare a statement of the entire financial situation to be included in the minutes of the meeting.

Several resolutions were then adopted. One was that for the present checks should carry two names, that of the president and that of B. A. Hegeman, Jr. Another was that the president would be authorized to issue a note for $10,000 to care for any immediate liabilities of the association.

CONVENTION IN OCTOBER, BUT WITHOUT EXHIBITS

John G. Barry, chairman of the committee on location for the next convention, was then called upon to present the report of that committee. Mr. Barry explained that the committee had canvassed the question of an exhibit at the next convention and had also conducted a poll of the manufacturer members of the association. The recommendation of the committee was that there should be no exhibit. The presentation of the report of Mr. Barry was followed by a general discussion as to the relative merits of different cities for the meeting. An early announcement will be made. It was decided that the convention would be held during the week beginning Oct. 2, and the president was authorized to confer with the committee on subjects to determine the length of the meeting, whether it should be four days as usual, or a shorter time because of the omission of exhibits.

OTHER BUSINESS TRANSACTED

Mr. Stevens for the Transportation & Traffic Association then asked the association to appoint a committee to take up certain phases of the one-man car situation, particularly to decide whether it would be worth while to compile considerable data in regard to the use of one-man cars and if so how best to obtain it. The motion was passed.

The president then announced that Frank Hedley, president Interborough Rapid Transit Company, had resigned as a member of the executive committee of the association on account of lack of time to attend to the duties of that office. The resignation was accepted.

The president then gave some figures of the number of requests for information that were being received by the association from member companies to indicate that the number of requests was increasing, showing that the normal functions of the association were going on and that it was of increasing benefit to the members.

E. C. Faber, Chicago, and Labert St. Clair of the association office, then gave some particulars as to the work of the committee on publicity. They explained that it is hoped to make May 4 a "National Electric Railway Day." On this day electric railways would be encouraged to emphasize the progress which had been made in the electric railway art during the last forty years and the additional service which these companies were now rendering the public. The date, May 4, was selected because it was the anniversary of the completion of the Richmond road in 1888. Mr. St. Clair then explained that a pictorial history of the industry was being compiled showing the growth and enormous increase in the investment, and the obsolescence to which such apparatus was subject. Mr. St. Clair also presented examples of car cards and other advertising, as well as other work of the department.

A discussion then followed on various methods of publicity. Mr. Budd told about the work of the Illinois Committee on Public Utility Information and said that a number of utility officials in Illinois had volunteered to be prepared to make addresses on utility problems before Chambers of Commerce and other organizations when requested to do so. Other speakers on the subject included Mr. Faber, Mr. Storrs, General Harries, Mr. Wickwire and Mr. Lambert.

The concluding business of the association was a discussion as to whether municipal properties should be admitted as members of the association, but no final action was taken. The meeting then adjourned.

National Electric Railway Day

MAY 4 has been designated by the American Electric Railway Association as National Electric Railway Day for the purpose of calling public attention to the present highly effective transportation service that the electric railways now render as compared to the service a third of a century ago. Electric railways throughout the country are urged to give the lesson of improved service on that day by displaying early-day cars, particularly horse cars, and by drawing attention to the improvements over former-day service. The big lesson, of course, that can be drawn from the display is that although service has greatly improved fares have scarcely increased, if, indeed, they are not lower in many cities, with the diminished value of the dollar, than they were in the old horse-car days, when the short hauls were in vogue.

May 4 has been selected because it is an important day in electric railway development. Thirty-three years ago on that date the contract for the first successful overhead trolley line to be conducted on a large scale was completed in Richmond, Va. Thirty cars were put into service.

A suggested program for the day and mats of photographs of early cars have been prepared by the advertising section of the Division of Information and Service and are being sent to member companies. Among the plans suggested are to man the early car with a crew which has been long in the service, offer prizes to school children for essays on the history of the local transportation system and provide the trainmen with badges carrying the words "National Electric Railway Day," etc.

Distribution of F. E. R. C. Report

ACTING Secretary J. W. Welsh of the American Association has notified member companies that a limited supply of the complete proceedings of the Federal Electric Railways Commission report, bound in buckram, are available. As far as the supply will permit, the association will furnish without charge a complete set of the volumes to any city or college library, or to any city official designated by a member company. As the requests must come through the member companies and as the librarians may not know about the report, it devolves upon electric railway officials to take the initiative in seeing that their local college and public libraries are given an opportunity to secure these volumes.

Hoover Resigns as President of American Engineering Council

AT ITS meeting in Philadelphia on Saturday, April 16, American Engineering Council of the Federated American Engineering Societies accepted the resignation of Herbert Hoover as president. Mr. Hoover gave as his reasons for resigning the fact that the council was, by its constitution, necessarily engaged in furthering national activities which involve legislation and that he as a member of the executive branch of the Government could not consistently direct such activity as an officer of American Engineering Council. The council expressed regret at Mr. Hoover's retirement, and voted its appreciation of his leadership during the organization period of the council and his initiation of policies and effort.

The meeting of the council was one of the most important yet held. The committee on the elimination of waste in industry presented a preliminary report and indicated some of the benefits to be derived by American industry from the final report.

L. W. Wallace, executive secretary, reported on the employment service of the council and made recommendations for its broadening, which were adopted. He also explained the activity of the council with respect to licensing of engineers, which was in line with the policy previously announced and indicated in these columns. Other matters reported on were publicity, petitions of the council for appointment of an engineer as Assistant Secretary of War, not obtained, and an engineer to the Interstate Commerce Commission, still under consideration, and other relations to the executive branch of the Government.

The next meeting of the council will be held in St. Louis on June 3.

Trackless Trolley at Leeds

RECENT reports from Great Britain indicate that Leeds is preparing for trackless trolley service in one section by providing a bituminous concrete wearing surface over the present paving and tramway tracks, completely burying the latter. The Leeds Corporation Tramways is said also to have under construction a trackless vehicle of the double-deck type, to seat fifty persons.

According to present plans this vehicle will be provided with pneumatic tires.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Open Shop Likely

Present Controversy at Davenport Would Seem to Leave This as Only Course Open

The open shop looms up as a strong possibility in the industrial policy of the Tri-City Railway, Davenport, Ia., after June 1 as a result of two moves against the traction lines founded on a contract with the trainmen's union.

First came an injunction suit by the Socialist city attorney restraining the company from putting into effect a wage reduction from 70 to 40 cents an hour. The Socialists in the City Council had previously refused the company permission to install one-man cars and otherwise economize.

For this reason the company is bound under this injunction to keep a 70-cent scale until June 1 or to continue losing money and meet the exacting demands of a ruinous contract although the company states that this contract was negotiated on the understanding that wages could be reduced if the Council did not grant a fare sufficiently high.

Again, matters were complicated for the company with the public when a state board of arbitration found against the railway in a dispute over the discharge of a union official. The board found that the company erred in not submitting this dispute to arbitration in accordance with the terms of its contract with the trainmen.

EDITOR THINKS COMPANY ERRED

Last year a compulsory arbitration clause in the contract brought an increase in wages from 60 cents to 70 cents an hour. During times of rising wages the contract did not protect the company as it voluntarily raised the wage above the contract scale in order to secure an adequate supply of labor.

For these reasons there is a strong probability that when the unions refuse to accept the contract the company might feel justified in suggesting that employees will be hired and paid as the company shall see fit and not in accordance with the terms of any contract—in other words, the open shop.

The finding of the state board of arbitration against the Tri-City Railway growing out of the discharge of the union president by the company has provoked considerable discussion. An editorial writer in one of the local newspapers stated that in view of this decision of the board the company should reinstate the discharged union president. He stated that the discharge had been caused by a public address made by the union president and that employees' associations would employ business agents if their officers could not speak without fear of discharge.

While the board which considered the matter of the discharge found the company was in error in denying the arbitration of the controversy, it did not recommend the reinstatement of the discharged union official, stating this was not within its province.

Wage Reduction Accepted Willingly

A group of former employees of the Eastern Massachusetts Street Railway, some of whom have been out of work since that company ceased operation of its lines in Woburn, recently held a meeting in one of the carhouses and sent a letter to the trustees signifying their willingness to accept a reduced scale of wages if the trustees will resume operation in that district. A short while ago a similar communication was received from some of the men who worked on the Gloucester lines before that division suspended operations.

Cleveland Men Accept Wage Cut

MEMBERS of the union in Cleveland, at a referendum election on April 15, voted 2,158 to 348 in favor of a 20 per cent reduction in their wages effective May 1, when the present agreement with the Cleveland Railway expires. They ratified the wage cut rather than submit the matter to arbitration along with the proposition of permitting the open shop question to be an issue in arbitration proceedings.

Starting on May 1 trainmen in Cleveland will receive 55 cents an hour for the first three months of service; 58 cents for the next nine months and 60 cents an hour after the first year, instead of 70, 73 and 75 cents an hour, the rate which has been in effect. The company will still pay time and a half for Sunday and holiday overtime, but only time and a quarter for overtime on week days. Extra pay for spreads of more than fourteen hours on swing runs is abolished. There will be no eight-hour limit for runs on Sunday and holidays as in the past, nor will ten hours' pay be given for eight-hour runs on night cars.

Officials of the Cleveland Railway estimate that the wage reduction for trainmen will save the company close to $100,000 a month. There is little prospect, however, of a change in fare under service-at-cost in the near future, for on April 1 there was a deficit of $50,000 in the interest fund, which must be built up to $750,000 before there can be a reduction in fare.

Wage Cut in Detroit

Mr. Burdick Reiterates Determination of Company to Reconcile Pay with Changed Economic Conditions

That the wages of the platform employees of the Detroit (Mich.) United Railway are to be decreased from 20 per cent to 28 per cent effective on May 1 was announced in a letter under date of April 15, addressed by E. J. Burdick, assistant general manager of the company, to officials of Division 26 of the Amalgamated Association. The decrease will put the men on the pay basis which existed before the wage increase of last May. It is being made because the company can no longer support the present pay roll and render adequate service to the public.

The pay for all motormen and conductors in passenger and freight service except those employed on the Pontiac and Flint city lines will be as follows: for the first three months, 50 cents an hour; for the next nine months, 55 cents an hour; after twelve months in service 60 cents an hour. The rates for Pontiac and Flint city line employees will be 2 cents less an hour in each of the three classes.

In his letter Mr. Burdick calls attention to the fact that since Jan. 1, 1916, wages of the low rate men have been increased 180 per cent, of the middle rate men 143.33 per cent, while the wages of the high rate men have been increased 134.38 per cent during the same period. A table showing the fluctuations of living costs for the period included between Jan. 1, 1916, and April 9, 1921, is included in the letter.

The present rates of pay received by the three classes of men are 70 cents, 73 cents and 75 cents an hour. The reductions to 50 cents, 55 cents, and 60 cents an hour will mean decreases of 28.57 per cent, 24.66 per cent and 20 per cent. The new rates will exceed the 1916 rates by 100 per cent in the case of the low rate men, 83.33 per cent for the middle rate men and 87.50 per cent for the high rate men.

A reduction in pay to all employees except motormen and conductors was made effective on Jan. 1, of this year. When the company proposed last December to decrease the wage rates of platform employees 20 per cent, the union officials questioned the company's right to open the wage question at that time. The men were willing to arbitrate the matter and an arbitrator was appointed by the company and one by the men. The two arbitrators were, however, unable to agree on a third arbitrator to complete the board.

No opinion has been expressed by the union officials as to whether or not the proposed wage cut will be accepted.

Utilities Commission Re-created

Kansas Industrial Court Overloaded and Another Body Is Created to Supervise Utilities

Governor Allen of Kansas, having found the Kansas Court of Industrial Relations too busy to handle the public utilities of the state in addition to the industrial question, addressed a special message to the Legislature on this point, and as a result that body has re-created a utilities commission to replace the one which had been abolished at the time of the creation of the Industrial Court and whose function had been assumed by the Industrial Court.

COMBINED HEARINGS PROVIDED

The new law provides, however, that cases involving question of wages, industrial conditions, or other industrial disputes, within the normal jurisdiction of the Court of Industrial Relations are to be heard as a combined case and determined at the same time by the Public Utilities Commission and the Court of Industrial Relations sitting as one body. The presiding judge of the Court of Industrial Relations is to preside at the hearing, and in the event of a tie vote the presiding judge of the Court of Industrial Relations is to cast the deciding vote.

National and local interest attached to the operations of the Kansas Court of Industrial Relations from the inception of that body. The fear that arose when it was proposed to re-establish the Utilities Commission that the advantageous feature would be lost of having one court look into both sides of a utility question, with regulatory power over labor as well as over capital, was overcome by placing a case which involved both labor and rates of fare before both commissions as a combined body. This fear, although pronounced, was shown by Governor Allen to be largely groundless, for in his message to the Legislature he pointed out that out of 650 public utility causes before the Industrial Court in the past year only three related directly to the subject of both rates and wages.

DUAL AUTHORITY CAUSED CRITICISM

In his argument for the re-establishment of the Public Utilities Commission Governor Allen pointed out that the unfortunate results of adding public utility administration to the work of the Court of Industrial Relations was to make up public utilities law paramount and the work of the Industrial Court incidental. Moreover, the Industrial Court had been unable to touch many duties of general industrial development. The Governor said:

> In addition to the criticism of the court, due to lack of time for proper industrial work, it has suffered constant misrepresentation out of the unavoidable confusing of its purposes with the purposes of the public utility work. During the year in which the old Public Utilities law had been administered by the Industrial Court, there has been 650 public utility cases. The court has deemed it wise in a great number of these cases to increase public utility rates.
>
> Notwithstanding the fact that none of the principles of the Industrial Court law were concerned in these public utility increases, every criticism that has come as the result of the increase in public utility rates has been placed, not upon the old Public Utilities law, but upon the new Industrial Court.
>
> Public utility regulation thus was dramatized as a new thing which had its origin in the Court of Industrial Relations. The fact was lost sight of that it was a work carried on since the establishment of the Board of Railroad Commissioners in 1883, and the Industrial Court became familiar to the public, not upon its merits, but upon the activities which attend its regulation of public utilities in a peculiarly trying period.
>
> Public utility administration, instead of becoming incidental to the Court of Industrial Relations, became distorted into the chief aim of the new court. The big, real purpose of the labor court was lost to public view. The real purpose and value of public utility regulations also became subjected to the unreasoning attack of those who as a result of labor politics was fighting the Industrial Court.

Judge Clyde M. Reed, one of the members of the Industrial Court, was made chairman of the new Public Utilities Commission. Further facts with relation to the personnel of the commissions will be given in a later issue.

God Bless Stone & Webster!

The Seattle *Daily Times* recently closed its contest and awarded prizes for the best solution of Seattle's municipal street railway problem, for which a prize of $200 was offered. In the final analysis, the *Times* was unable to decide upon a single plan. In consequence, two winners were picked by the judges, and the full sum of $200 was awarded to each.

The prize-winners were selected from the twelve contestants who had won prizes of $25 each in the weekly contest. The two prize-winning solutions were submitted by E. H. Severson and C. T. Conover. Mr. Conover said:

> There is only one thing to do—get down on our knees to the former owners of the street car lines, humbly and contritely beg their foregiveness, give assurance of a fair deal in future and make the best arrangement possible for a return of the lines. This would involve granting a fair equitable franchise and affording the company absolute security from persecution by the City Council. Perhaps nothing of this sort can be accomplished but it is the only hope.
>
> Stone & Webster came into this city and bought up a lot of disconnected lines, some of them in the hands of receivers. The money was supplied by several thousand middle class New England people—some by the estates of widows and orphans—all invested on Seattle's good faith and prospects. The company became the largest employer of labor in Seattle and, unt harassed by the City Council, gave us an admirable car service and made all reasonable extensions. It paid the largest burden of taxes of any corporation in Seattle ar in addition paid a gross earnings tax; had to help build bridges, pave streets, etc.
>
> It became the sport of the City Council; it was baited and harassed and strangled until no further extensions were possible; the equipment fell off and dividends practically ceased. Then the city stepped into the pit it had dug, surrendered the vast revenue from taxes and undertook to operate by political means what had very nearly failed under efficient private management, besides paying for the system from the revenues.
>
> Every sane man knew it could not be done. There is only one solution: On what basis, if any, will Stone & Webster take the system back, assuming that they can be assured that the property will not again become the football of political opportunists?
>
> Meantime we must elect to the City Council men pledged to fight to the last ditch to prevent the $15,000,000 of utility bonds from becoming a general obligation and whose pledged word is known to be good. After that we shall have to "let nature take its course."

Purchase Negotiations Begun

Detroit United Railway Accepts Gracefully the Will of Voters and Helps City

Conferences are being held between the attorney for the Detroit United Railway and city officials with a view to starting negotiations for the city to take over eight day-to-day agreement lines of the railway as approved by the people at the recent election. According to Mr. Stevenson, counsel for the company, engineers for the company are now working on the cost figures of these eight lines. The figures will be taken from the company's books and will be based upon the cost of tracks and equipment.

PRICE MAY BE ARBITRATED

The day-to-day agreement lines were built by the company but the city reserved the right to take over the lines at cost less depreciation at such time as it was desired to operate them as part of a municipal system. It is the mutual belief of the company's attorney and the city officials that a board of arbitration will be resorted to to settle the price to be paid by the city.

While no definite views were expressed regarding the question of taking over the Fort Street and Woodward Avenue lines where franchises have expired, it was intimated by Mr. Stevenson that the company was willing to consider the views of the city at such time as the people decided that the city should take over these lines, with the idea of fully co-operating with the city in providing the needed service.

The Fort Street and Woodward Avenue lines, if joined with the lines the city is constructing and with those which it is planned to take over, will give the city two main lines to the heart of the city. The recent ruling of the Supreme Court upholding the legality of Mayor Couzens' municipal ownership system also held that the company's rights on Fort Street and Woodward Avenue having expired, these streets would have to be vacated any time the city desired. City officials believe that these lines will not be torn up but that they will be taken over instead in order that the people be subjected to as little inconvenience as possible. The voters may be called on to decide upon the purchase of the Fort Street and Woodward Avenue lines.

CROSSING QUESTION BEING ADJUSTED

The question of crossing of the company's tracks by city lines was also touched upon in the recent conference. Corporation Counsel Wilcox has filed a brief in the suit instituted by the city to determine judicially the city's right to make such crossings. A copy of the brief and blue prints of what the city considers the proper type of crossing have also been submitted to Mr. Stevenson. As soon as the company's engineers approve the blue prints, temporary crossings will be permitted until a type of crossing has been decided upon for permanent installation.

Agitation to Abolish Wisconsin Commission

Assemblyman Peterson of Milwaukee has announced that he will endeavor to have legislation enacted abolishing the present Railroad Commission. The idea is to substitute in its place a Public Service Commission with a membership of three, the personnel to be appointed by the Governor. It was Mr. Peterson who started the proceedings which resulted in the interpellation of the commission of Feb. 24 by Legislature regarding the commission's policy in dealing with public utilities.

An effort will also be made to have enacted an amendment to the public utility law which would require utility companies earning more than 8 per cent to place the excess in a sinking fund to be used to care for emergency conditions or for such other similar purposes as shall be determined from time to time by the proposed public service commission. The theory seems to be that the reserve fund would tide utilities over lean years and, perhaps, avoid increased rates. The measure will also provide that in fixing the value of a utility's property invested capital shall not be construed to include borrowed capital.

Whatever opposition exists to the present Railroad Commission will probably be mobilized in support of the Peterson legislation, but it is said to be doubtful whether this legislation will be enacted.

In connection with the attack upon the present commission, the Milwaukee Common Council has adopted a resolution instructing the City Attorney to draft legislation for introduction in the State Legislature abolishing all authority of the Railroad Commission over public utilities, vesting such authority in Common Council.

At the proceeding on Feb. 24, which revolved mainly around the Milwaukee Gas Light Company, Chairman Jackson of the Commission told the Legislature that the Milwaukee Gas Light Company, which had been recently granted a 20 per cent increase in rates, is earning only 3.7 per cent on its valuation as compared with 8 per cent considered reasonable by the commission. It was brought out that in the past ten years the Gas Company had declared dividends averaging 13.8 per cent and that in 1916 the dividend rate had been 23.7 per cent. Mr. Jackson pointed out, however, that the policy of Wisconsin regulation is to permit a fair return on the physical valuation basis and not to regulate dividends.

Trial Operation for Three Months

The railway system at Marietta, Ohio, has begun operations for a trial period of three months, during which time the officials of the company hope to demonstrate to residents of the community and city officials the exact financial status of the operation of cars in this city. One-man cars are being operated, with a 7-cent fare. Service is maintained over three separate routes, transfers being issued to other lines.

With the expiration of the company's franchise, a tentative agreement was reached between traction officials and members of the City Council whereby the present test of three months was started. During this time receipts and expenditures on the various city lines will be recorded in order to determine exactly the revenue derived from each. The Council is privileged to examine all books of the company during the trial period and to name an auditor to examine accounts. A detailed report showing the expenditures and receipts of each line will be filed with the Mayor within fifteen days after the expiration of each thirty-day period.

New York State Wages to Be Arbitrated

The employees of the New York State Railways in Rochester, Syracuse and Utica represented by their union officials and the officers of the company have signed an agreement providing for the arbitration of the differences caused by the proposal of the company to reduce the wages of the men 25 per cent. The action came as the finale of more than a week's negotiation.

As noted in the ELECTRIC RAILWAY JOURNAL several weeks ago the company submitted a revised agreement to become effective on May 1. In this proposal it said that it felt that the wages as fixed by the National War Labor Board for trainmen under date of July 31, 1918, would be fair to all parties interested under the contract. The company also outlined changes which were desired in working conditions. It explained at that time that the wages of the employees had been increased 126.41 per cent over those paid at the beginning of the war.

In accordance with the provision of the present contract calling for arbitration the company will appoint an arbitrator, the men will appoint an arbitrator and these two will appoint the third member.

Pending the decision of the arbitration board the working conditions of the 1920 contract are to remain in force, but the rate of wages in the company's contract submitted under date of March 29, 1921, are to become effective as of May 1, except that in no case will the differential be more than that of motormen and conductors on city lines. It has also been agreed that the question of wages to be paid men operating one-man cars will be determined by the arbitration board. The award is to be retroactive to May 1. Both sides agree to be bound by the findings.

Benjamin E. Tilton, vice-president and general manager of the New York State Railways, has been selected as the company's representative on the arbitration board. Mr. Tilton was the company's arbitrator in the settlement of the strike of last May.

Mr. Culkins Sees Municipal Ownership Ahead

That the final outcome of the railway tangle in Cincinnati, Ohio, might be municipal ownership of the local railways was intimated by William C. Culkins, Director of Street Railways, in a letter addressed to members of the Ohio Senate, condemning the Griswold bill limiting municipal indebtedness as it has been amended and now pending in the State Senate.

Mr. Culkins said in his letter that in behalf of the car-riding public he urged the Senators to use their best efforts to bring about the defeat of the measure in its present form, since it practically would nullify the constitutional privilege of owning public utilities other than water-works.

Part of the letter reads as follows:

> Although Cincinnati may never desire to exercise its purchase option, nevertheless it is within the range of possibilities that the present railway reorganization tangle can only be clarified by the city exercising its right to condemn and to buy the property.
>
> The passage of any legislation which would take away from the city the power to exercise its option would materially weaken its position in controlling the traction situation and would in my opinion represent a triumph of the traction lobby over the constitution of the State.

Mr. Culkins said that there was nothing new concerning a definite plan for scaling down of capital of the Cincinnati Traction Company, but from the tone of his letter to the State Senators it is believed by persons interested in the traction situation that the city wants to be in a position to carry out its rights and not be hampered or handicapped by such a measure as the amended Griswold bill.

Trackless Trolley Recommended

The General Electric Company has recommended that the trackless trolley system be considered in the disposition of the railway problem of Greenville, Tex., according to H. L. Andrews of the railway and traction division of the company, who has made a special report of the Greenville transportation problem.

A trolley car system for Greenville is estimated to cost a minimum of $251,600, which would provide five cars, the rebuilding of more than 9 miles of track and the construction of 2.72 miles of new track.

The estimated cost of the trackless trolley system with the same number of cars is given by Mr. Andrews as a minimum of $107,000 with the possible maximum of $109,300. The cost of installation of five storage-battery cars over the same mileage is given by L. Klopman, in a supplementary report, as $199,330.

Peoria Men to Ask Increase. — Motormen and conductors of the Peoria (Ill.) Railway are said to have prepared demands for presentation to the company calling for an increase in wages of 3 cents an hour. This would increase the maximum wage from 59 cents an hour to 62 cents.

Boston Elevated Trustees Report on Fares

Different Rates Refused for Competitive Parallel Routes—Trustees Hope to Reduce Basic Fare When Deficit Has Been Wiped Out

In a report just made to the Massachusetts Legislature the trustees of the Boston Elevated Railway not only reaffirm the prediction made in their last annual report that the deficit of last year will be wiped out by July 1, 1921, but further suggest the possibility of some slight reduction in the present 10-cent fare after that date.

THE present report was made as a result of a resolve of the Legislature requiring the trustees to report on the feasibility of instituting a 5-cent fare on the line from Fields Corner, in Dorchester, to the South Station, in Boston. This latter proposition, the trustees refuse to recommend, as the distance is too great, and what they consider more important, such a line would be in direct competition with the regular 10-cent lines.

The trustees reported that the introduction of a 10-cent fare under the requirement of the Public Control Act instructing the trustees to establish fares which would meet the cost of service, resulted in an increase of revenue which, with economies and new methods of operation, has since been sufficient to meet the cost of service. The installation of the 10-cent fare, however, was accompanied by a loss in traffic at first large, then gradually diminishing and not yet fully made good.

This loss was largely confined to two classes of travel, one within local limits in outlying communities and the other between the business center of Boston and localities in close proximity. The through traffic between this centre and localities at the greater distance was not seriously affected although there was some loss of riding among those living along the lines of steam railroads, especially near stations where the railroad fare was less than 10-cents.

Under the law the trustees had no power to make experiments that would jeopardize the total revenue necessary to maintain a self-supporting service. They could, however, make experiments that offered reasonable promise of restoration of lost traffic without material invasion of net revenue or without the imposition of any unjust burden upon the rest of the riding public.

The localities selected for experiment were those which seemed to offer short distance riding, without transfer, upon surface lines not connected with the rapid transit service. Eight lines of this kind have been established each with a 5-cent fare, restricted to certain hours and to days other than holidays and Sundays. Five of them proved failures and were discontinued, but three of them are still in operation.

The policy of the trustees is:

> To add a practically non-competitive new service, the net earnings from which are larger than the average earnings on all lines so as to increase net revenue and to enlarge the usefulness of the railway. To add a service which competes with the 10-cent lines and in so doing substantially lessen net revenue would be to impose an unwarranted burden upon the rest of the travelling public and to threaten a deficit to be assessed against the cities and towns.
>
> Any plan that would furnish this limited service to some communities and deny it to others which offer like conditions would be plainly unjustifiable.

NO DIFFERENTIAL ALLOWED

The investigation by the trustees of the demand for 5-cent fare to Field's Corner from the South Station disclosed facts that appear to prohibit such service. The distance covered by the proposed routes would be 3.6 miles in one case and 4.6 miles in the other. The distance covered by the line in South Boston is 2.8 miles, that in Charlestown 2.4 and that on Washington Street in Boston 1.9 miles. Whatever might be the receipts upon the proposed lines in so far as they represented restoration of lost traffic or new patronage, they would beyond question be too small to bring them within the rule which has been adopted in protection of net revenue. Vital factors in the situation therefore seem to forbid the establishment of these lines named.

Continuing, the report says:

> It does not follow, however, that the outlook for a limited cheap service in this district is hopeless. It lies rather in the direction of the experiment with another type of such service which, after a thorough investigation of conditions and upon a favorable report from General Manager Dana, has been introduced within a few days in Everett and Malden. This experiment is based upon the opportunity which physical transfer of passengers between surface cars and rapid transit trains at the Everett Terminal affords for an operating test of certain local lines in those cities under a low fare. The purpose is the restoration of local travel lost under the 10 cent fare with an increase in patronage that will mean more useful service upon lines where traffic is now light.

This experiment if successful the trustees say will have great significance in pointing a possible way to other restricted service in connection with the physical transfer now made, between surface cars and rapid transit trains. However—

> It is not to be understood that these experiments with limited service will be allowed to delay or interfere in any way with a future reduction in the 10 cent basic fare whenever conditions make it possible to bring it about. The general interest in that fare and paramount importance of the service under it constitute the reason for the restrictions upon all cheaper service which the trustees believe must be rigorously maintained.

No reduction can yet be made, the trustees say, in the 10-cent fare over lines which as a part of the entire system carry extraordinary cost of investment in subways, tunnels and elevated structures, and which rightly demand, as a fundamental need, speed, frequency of service and operation over long distances throughout the day and far into the night, on holidays and Sundays as well as on ordinary week days. Conditions now, however, seem to point toward the possibility of some reduction in that fare. The trustees in their last report predicted that the operating deficit outstanding on Dec. 31, 1920 would be absorbed before July 1, 1921.

The excess of receipts over expenditures for the first three months of this year has already reduced that deficit so that it is now practically assured that with the continued practice of justifiable economies the operating deficit of the earlier part of the year will have been made good, and the long outstanding deficit of $435,348.46 incurred in May and June of 1919 will have been eliminated. This result will make it possible for the trustees in their report of next July to outline the conditions under which and the extent to which some reduction in the 10-cent fare may be expected.

Phenomenal Record of Interurban Outlined

At the sitting of the Ontario Hydro-Radial Commission at Toronto during the week of April 11, Charles E. Thompson, assistant to the president of the Chicago, North Shore & Milwaukee Electric Railway, gave evidence. This is the commission that is considering the advisibility of building an electric railway from Toronto to Hamilton. Mr. Thompson went into the history of the road, its cost to construct and its cost to operate. He said that the labor bill now consumed 38.90 per cent of the total operating expenses. Wages for conductors and motormen ranged between 70 and 80 cents an hour. If the estimates of the Hydro Commission of Ontario at 55 cents an hour were applied to the North Shore railway the expenses of that company for labor would be reduced about $500,000 a year.

The witness told the commission that 1¼ cents per mile was the lowest commutation rate the road could allow without piling up unprofitable business. In the early days, the roads offered specially low rates in order to attract business and as the years went by these rates became fixed in the public mind and it was very difficult to secure higher rates. He thought the roads should get higher rates for suburban service.

Power expenses now amounted to 49.80 per cent mainly through the increase in the price of coal, representing a 20 per cent advance. The operating ratio for the year was 76.83 per cent exclusive of taxes, and 80.41 per cent with taxes.

By liberal expenditure upon equipment the gross earnings of the road had been increased from $1,000,000 to $4,000,000 a year. This phenomenal increase had been secured in the face of competition with five other roads running from Chicago to Milwaukee. Passenger traffic had grown from 7,459,669 in 1916 to 13,288,186 in 1920, largely because adequate entrance had been secured to Chicago.

One-Man Car Invades Pennsylvania Avenue

Pennsylvania Avenue, Washington, D. C., is the latest railway thoroughfare to welcome one-man car operation. True, there is only one representative of this clan among the numerous green cars of the Capital Traction Company, which traverse this nationally important thoroughfare, but this one representative seems able to hold its own in the heavy traffic.

The car in question is not a standard safety car, but is one which was rebuilt in the shops of the Capital Traction Company from an old Stephenson single-truck longitudinal-seat car. This car was recently equipped for one-man car operation, and while the body, truck and electrical equipment are those of the old car it does have the complete safety device equipment of the standard safety car, furnished by the Westinghouse Electric and Manufacturing Company.

The mechanical details are unimportant, however, for the present purpose as the car was put on Pennsylvania Avenue, starting operation Sunday, April 10, for an experiment from the traffic standpoint. It operates on a route from the Georgetown carhouse to Seventeenth and Pennsylvania Avenue, Southeast, then returns to Twenty-sixth and G Street, Northwest, then returns to Seventeenth and Pennsylvania Avenue, Southeast, thence to Georgetown and repeat. This takes this car through the heaviest traffic of the day, when the regular double-truck cars are operating at scheduled speeds of 8.5 m.p.h. and on headways of fifteen seconds and sometimes less. This one-man car maintains its place in traffic with thorough satisfaction. It is attracting a good deal of attention on Pennsylvania Avenue for it is about the same size as the newly installed Sixteenth Street buses, which also operate for a short distance on Pennsylvania Avenue.

The Capital Traction Company is announcing no future plans with reference to one-man cars, either on Pennsylvania Avenue or elsewhere on the system, but has put this car in operation merely for experimental purposes.

Publicity Campaign for Schools and Libraries

The Indiana Public Utility Association is preparing special bulletins which will discuss the origin and growth of the public utilities in the State and their problems for distribution among the libraries and public high schools for reference work. The first bulletin, of a general character, will go into the public utility business from a broader standpoint, while the other bulletins, eight in all, will deal with the various utilities separately. For example, one will take up the interurban problem, one water, one gas, one telephone, etc. John Mellett, who is in charge of the work of the Indiana committee on Public Utility Information, sent out letters recently to 204 libraries and 128 high schools asking if they desired copies of the booklets. Within three days he had received eighty-six favorable answers from the libraries and fifty-eight from the high schools. Not one was unfavorable.

Construction Being Hastened

Municipal Road at Detroit Hopes to Complete 82 Miles of Line This Year

According to announcements by the city officials of Detroit, Mich., work will be pushed with a view to completing as soon as possible certain Municipal Railway lines to connect with the Detroit United Railway lines which the people voted to acquire from the company.

Proceedings leading to the taking over of the lines at issue will probably be started by a letter from the Street Railway Commission to the company to serve as official notice of the commission's intentions. The commission will probably ask the Detroit United Railway to name the price at which it will sell the railway lines the city proposes to buy. The value of the lines will probably be finally decided upon either by a board of arbitrators or by the courts.

Work has been started at several points on the new municipal lines as part of the program to build 82 miles of lines before the end of the present year. The municipal line on VanDyke between Charlevoix and Harper Avenues is expected to be in operation in about two months. It will be the third line put in operation, and will connect the St. Jean and Charlevoix lines now operating.

The sale of $2,000,000 of railway bonds has been authorized by the City Council, the proceeds to be used in financing the commission's construction program. They will mature in from twenty-seven to twenty-eight years. They are part of the $15,000,000 bond issue voted last year.

Suit for $100,000 damages has been brought against the city by John A. Mercier, the contractor who built some of the first sections of the municipal ownership line last year and whose contract for work on the uncompleted portion of the Charlevoix-Buchanan lines was canceled by the city. Mercier's previous suit to enjoin the commission from canceling his contract and proceeding with construction with its own forces was dismissed by Judge Hunt.

A. C. King has been appointed arbitrator for the city, and H. A. Crecelius, Chicago, has been appointed arbitrator for the Detroit United Railway in the matter of the crossing controversy resulting from the forced crossing of the company's Mack Avenue line by the St. Jean municipal line. No definite decision has so far been reached and the proposal has been made by Corporation Counsel Wilcox that the city be permitted to use the crossing temporarily, as it is now installed. If no agreement is reached the court will probably appoint a third arbitrator.

New Franchise to Be Negotiated in Vancouver

With the object of arriving at a fair and satisfactory agreement on the fare and franchise questions negotiations are to be commenced shortly between officials of the British Columbia Electric Railway, Vancouver, B. C., and representatives of the various municipalities on the mainland served by that system. Mayor Gale has announced that the city will be ready in a short time to enter into discussion of the proposed franchise requirements of the company. By agreement entered into with the city all negotiations on franchise and rate questions must be concluded before Aug. 1.

The company's future policy of extensions and improvements depends very largely upon the arrangements it is able to make in regard to franchise. The company has announced that it will be required to expend at least $1,000,000 before the end of 1922 on improvements to its Stave Lake plant to provide the power necessary to keep pace with the constantly growing demands of the city.

It is pointed out that if unreasonable regulations and starvation rates are exacted of the company by the city officials the problem of raising the necessary capital to make the required improvements will become increasingly difficult.

Italian Commission Will Arrive Soon

The Italian Commission on Railway Electrification, which expects to make an extended trip through the United States and Canada, visiting all heavy traction systems, will arrive from Europe on April 25 aboard the *Lorraine*. The commission is headed by Prof. Guido Semenza, consulting engineer, while the other members are Prof. Cian Giacomo Ponti, electrical engineer, Italian-American Electric Company; Marquis Ferdinando Cusani, manager, Italian-American Electric Company, and Curzio De Regibus, assistant chief engineer electric traction service of the Italian State Railways.

Besides all electric heavy traction installations the itinerary of the commission includes inspection of all urban rapid transit systems, the principal electric interurbans and many large electrical manufacturing plants. In addition such hydro-electric plants and high-tension transmission lines will be visited so that they may familiarize themselves with the most recent American practice regarding hydraulic power generation and transmission.

One of the main purposes of the delegation is to bring about better technical relations between Italy and the United States and a better reciprocal knowledge of the status of technology and electricity in both countries. This thorough investigation of the American transportation systems involving electric traction will probably keep the members of the commission in this country until Aug. 1.

Progress in Akron's Franchise Situation

The Merchants' Committee, chosen by the various civic organizations in Akron to assist in bringing about a satisfactory settlement of the street railway situation, is making progress toward ironing out the differences between the city and the Northern Ohio Traction & Light Company. The disagreement involves the sections of the franchise ordinance dealing with the method of valuation of the property and the rate of return to be allowed on that valuation.

The question of the valuation of the system seems in a fair way toward settlement. The city has secured the services of Hagenah & Erickson, the engineering firm that made an appraisal of the property for the city in 1918, while the company has secured the services of the firm headed by Dean M. S. Cooley of the University of Michigan, which it employed last year in making a valuation.

Hagenah & Erickson valued the city lines at $4,810,000 in 1918 while Dean Cooley placed a valuation of $7,200,000 on the lines last fall. It is expected the two firms will use their old valuations as a basis soon to reach an agreement. With the arrival at a valuation figure by these two firms the way will be opened for further negotiations when a settlement of the other points at issue will probably be reached without great delay.

Mayor Beck has announced that the Council will unquestionably pass any ordinance which has the approval of the civic organizations represented by the Merchants' Committee.

Taxpayers Still Attacking Purchase Deal

Attorneys for the Puget Sound Power & Light Company, Seattle, Wash., on April 11 filed an amended complaint in the United States court in an equity action against the fourteen taxpayers suing the city in the Superior Court. The equity action previously filed against the taxpayers, asking for a temporary injunction, was dismissed April 1 by Federal Judge Jeremiah Neterer, his order of dismissal, however, allowing an amended complaint.

The amended complaint alleges the taxpayers have combined and confederated together to induce and compel the city to default in and breach the contract between the city and the Stone & Webster interests, executed to provide for payment of interest and principal on the $15,000,000 bond issue by which the city bought the railway property of Stone & Webster for municipal operation.

It is alleged that action of the defendants in denying, and in continuing to deny, that the city is obligated to pay the interest and principal from the gross revenues of the railway, in case such gross revenues are not sufficient to also pay costs of operating the system and its maintenance, has impaired the value of the $15,000,000 bond issue by many thousands of dollars. The action asks for a temporary injunction preventing the taxpayers from continuing to make these alleged claims and assertions, and from making any attack on the special fund created by city ordinance for payment of interest and principal on the bonds.

News Notes

Arbitrator to Settle Wage Dispute.—The employees of the Scranton (Pa.) Railway are seeking increases ranging from 10 to 13 cents an hour. The company refused the demands and suggested that the men consider accepting a reduction in wages or submit all matters at issue to an arbitrator or board of arbitration.

Commission Bill Lost in Committee.—The Illinois House of Representatives has refused to take from the state public utilities committee the bill introduced by Representative Alpiner to abolish the Illinois Public Utilities Commission. It was a strict party vote, the Republicans supporting a motion to postpone action until April 21.

Chicago Men Want Contract Renewed Unchanged.—The trainmen's union of the Chicago Surface Lines voted unanimously on April 4 to notify the company that it desired a renewal of the present contract, without change, for another year. The agreement expires on June 1. Both parties to it are required to give at least thirty days' notice of any proposed change. The Surface Lines management has not yet indicated its position.

Municipal Ownership Proposed in Eureka.—The city of Eureka, Cal., wants to buy the street car system operated in Eureka by the Humboldt Transit Company and has asked the Railroad Commission of California to fix a value of the tracks, equipment of all kinds, franchises and lands owned by the company. The application asking the commission to determine the just compensation to be paid by the city was filed on April 12 by George W. Cousins, Mayor of Eureka.

Supervisory Jurisdiction Proposed.—A bill is pending in the Legislature of Pennsylvania which provides for the extension of the duties and scope of the Department of City Transit of Philadelphia to include a supervisory jurisdiction over street railways in addition to the authority the department now has over city-owned lines. The Council of Philadelphia has indorsed the measure, but the bill on April 15 was still in the municipal affairs committee of the Senate. Senator Vare is chairman of this committee. It is charged that he is holding up the legislation.

Commission Wants Its Powers Extended.—The creation of a Public Utilities Commission by converting the Florida Railroad Commission into such a body is recommended by the State Railroad Commission in its twenty-fourth annual report to the Governor. That body is preparing a bill for introduction in the Legislature at its April session to bring this about. The commission's plan for financing the new body includes the levying of a tax on the gross operating revenues of all electric railways, lighting plants, gas companies, water companies, etc.

Commission Lowers Wage.—The Kansas Public Utilities Commission recently decreed that the railroads cannot close small way stations, has set $40 a month as the proper wage for such station agents and has decided that such stations need not remain open throughout the day. The decision was the result of the roads' attempting to close a large number of small stations because the cost of operating them exceeded the revenue therefrom. The commission's ruling has broken a wage agreement with the Brotherhood of Railroad Telegraphers whereby the men were paid 53 cents an hour for an eight-hour day. It is expected that the union will appeal to the Industrial Court.

Program of Meeting

C. E. R. A. Summer Meeting

The Central Electric Railway Association has issued a bulletin describing the summer meeting and outing to take place on board the S.S. South American during a six-day cruise on the Great Lakes. As previously announced the boat will leave Chicago at 8:30 a.m. on June 26, arriving at Toledo on Tuesday morning. It will proceed from there to Detroit, and then on to Benton Harbor, returning to Chicago on Friday, July 1. Everyone is urged to take advantage of the entire cruise starting from Chicago; especially those living in that vicinity, for it will be convenient for them to take the boat there rather than to take a train to Toledo and embark from there. Tickets should be secured from John Benham, International Register Company, 15 South Throop Street, Chicago.

Tickets for trip on the steamship, including meals and berth and including Government war tax, are as follows:

Round trip ticket from Chicago to Toledo and return to Chicago, covering the entire cruise, $70 each.

Toledo to Benton Harbor including war tax, $35 each.

Toledo to Chicago including war tax, $37 each.

Children more than five and under twelve years of age and accompanied by their parents will be charged half the full fare. Children under five years of age will be carried free, but there will be a charge of 75 cents each for any meals served to them in the dining room.

Financial and Corporate

$130,120,197 Investment Increase

Despite This Figure, Reported in Illinois, Revenue for Paying Return Decreased in 1919 Over 1914

The accounting section of the Illinois Public Utilities Commission has recently made public the comparative consolidated statistics of the various public utilities of the State under prewar and post-war conditions. This consolidated statement, including the telephone, electric railway, electric light, gas and water utilities, brings out some interesting things, when comparison is made between the statements for the two years under discussion.

All of the utilities with the exception of the interurban railroads show a decrease in the ratio of net operating income to the book value of the properties in 1919 as compared with 1914. The reason for this exceptional position of the interurban railways is due, according to the statement of the commission, to the fact that a number of these companies resorted to the courts and obtained injunctions against the enforcement of the law limiting passenger rates to 2 cents per mile. In the accompanying consolidated statement for all utilities it will be noted that the amount of revenue available for paying a return on the investment, actually decreased in 1919 as compared with 1914, although the amount of investment devoted to operations in 1919 was $130,120,197 larger than in 1914.

If the same rate of return had been earned on the book value of the property devoted to public service in 1919 that was earned on the book value of the property in 1914, namely, 4.77 per cent, a net operating income of $53,304,018 would have been required in 1919. This amount is $6,264,316 in excess of the $47,039,702 actually earned in 1919, and indicates that the public of Illinois has received annually the benefit of more than $6,000,000 resulting from a reduction of this amount since 1914 in the earnings of the utilities.

Whatever may be said as to inflated capitalization before the commission had jurisdiction over the securities, the $130,000,000 added to the investment from 1914 to 1919 represents actual expenditures in money under the commission's regulations. Such added investment is entitled to a fair return for its use in the public service. Assuming that this $130,000,000 should earn 6 per cent, the amount required to be earned on this added investment would be $7,800,000 per annum. Deducting this from the amount actually earned in 1919, $47,039,702, leaves applicable to the $987,382,451 book value of property in 1914 only $39,239,702 of net income. This is $7,902,855 less than the net income earned in 1914. It represents a reduction of profits to the utilities of 16.76 per cent and a corresponding saving to the public. If it be assumed that the actual new investment since 1914 should earn 7 per cent instead of 6 per cent as above, the reduction in profit of the utilities would be 19.1 per cent.

The comparative statistics for the electric railways are shown in the accompanying statement. They cover twenty-nine interurban companies, twenty-two city companies, and nine combined interurban and city lines.

CONSOLIDATED STATEMENT OF THE ILLINOIS ELECTRIC RAILWAY COMPANIES

	Book Value June 30, 1914	Dec. 31, 1919	Per Cent Increase
Interurban lines	$84,057,041	$86,973,770	3.47
City lines	298,934,913	315,118,819	5.41
Interurban and city lines	50,615,298	52,072,805	2.88
	Operating Revenues		
Interurban lines	$6,540,372	$12,055,034	84.32
City lines	45,502,620	63,063,097	38.59
Interurban and city lines	4,941,557	6,302,485	27.54
	Operating Expenses		
Interurban lines	$4,330,407	$8,907,417	105.69
City lines	25,580,227	45,224,557	76.79
Interurban and city lines	3,339,073	4,919,779	47.34
	Net Operating Revenue		
Interurban lines	$2,209,965	$3,147,617	42.43
City lines	19,922,393	17,838,540	10.46
Interurban and city lines	1,602,484	1,382,706	13.71*
	Taxes		
Interurban lines	$254,309	$451,347	77.48
City lines	5,552,381	4,669,265	15.91*
Interurban and city lines	137,511	188,834	37.32
	Net Operating Income		
Interurban lines	$1,955,656	$2,696,270	38.37
City lines	14,370,012	13,169,275	8.36*
Interurban and city lines	1,464,973	1,193,872	18.51*
	Ratio Net Operating Income to Book Value		
Interurban lines	2.33 per cent	3.10 per cent	.77
City lines	4.81 per cent	4.18 per cent	.63*
Interurban and city lines	2.89 per cent	2.29 per cent	.60*

* Decrease

CONSOLIDATED STATEMENT ALL ILLINOIS UTILITIES

Item	1914	1919	Per Cent Increase
Total book value	$987,382,451	$1,117,484,648	13.18
Operating revenues	154,579,081	234,860,653	51.94
Operating expenses	95,870,774	172,253,049	79.67
Net operating revenue	$58,708,307	$62,607,604	6.64
Taxes	11,194,611	14,956,307	33.60
Uncollectible accounts	371,139	611,595	64.79
Net operating income	$47,142,557	$47,039,702	.22*
Ratio of net operating income to book value of property	4.77 per cent	4.21 per cent	.56*

* Indicates decrease.

Denver Bondholders Are Organizing

Holders of the first and refunding sinking fund mortgage twenty five-year 5 per cent gold bonds of the Denver (Col.) City Tramway are being solicited to deposit the bonds with a committee of which B. W. Jones, 16 Wall Street, New York City, is secretary. The court recently authorized the receiver to collect an 8-cent fare for adults, with two tickets for 15 cents, but the city and county of Denver are vigorously opposing even this temporary relief, and, in spite of the fare advance the current earnings, according to the committee of security holders, continue to be unfavorable.

On Nov. 1, 1920, the company defaulted the interest on $9,888,950 of bonds of the above-mentioned issue, and also on $484,500 Denver & Northwestern Railway first and collateral mortgage bonds. It had previously defaulted the interest on $2,498,000 of 7 per cent collateral trust gold notes. On Dec. 24, 1920, a receiver of the property of the company was appointed in the United States District Court for the District of Colorado, upon a creditor's bill.

The company has also defaulted a second installment of interest due on April 1, 1921, on the 7 per cent collateral trust gold notes, and it cannot yet be determined whether the company will be able to take up the defaulted Nov. 1 coupons on the first and refunding sinking fund mortgage twenty-five-year 5 per cent gold bonds before May 1, 1921, and it may be compelled to default the coupons due on that date. The committee now seeking deposits says that in the event of default on May 1 remedies under the mortgage would be available against the company.

A protective agreement has been prepared, under which the bondholers are requested to deposit their bonds. Copies of the agreement may be obtained from the Bankers' Trust Company, New York, or from the International Trust Company, Denver, Col., or from the Industrial Trust Company, Providence, R. I.

New York Utility Legislation Completed

Prospective Earning Capacity at Contract Rate of Fare Made an Element of Value Under Governor's Urging

Governor Miller's special message to the New York Legislature, on April 13, resulted in the final passage of an amendment to the General Public Service Commissions law, which will make mandatory instead of permissive the things the commission shall do and consider in a hearing for increased fares, and which adds a clause that the Transit Commission shall also consider "the estimated prospective earning capacity of such property at the rate of fare at the time fixed and existent"—that is, the prospective earning capacity of each property at the rate of fare contracted for by the company and city.

AS WAS reported in the issue of the ELECTRIC RAILWAY JOURNAL for April 16, page 748, the Governor included arguments to support the consideration of prospective earning power under a franchise or contract rate as being one element to consider in the work of making a valuation.

The Governor's special message, which outlined some of these arguments, follows in full:

> The ordinary standards of physical valuation, either original or reproduction cost less depreciation, do not meet the emergency with which we have to deal, and physical valuations according to any standard that could be prescribed will in most cases under existing conditions be grossly unfair to the public.
>
> It is claimed that many surface lines in New York City cannot be operated at a profit at any reasonable or practical fare, and it will doubtless be necessary to discard some lines and operate others even at a loss to provide the public the necessary service. Any plan or any rate based on the physical valuation of such lines would manifestly be unjust to the public.
>
> ### INFLATED VALUES GUARDED AGAINST
>
> Moreover, the rate of fare fixed by franchise or contract is a proper, if not an essential, element to be taken into account in the valuation of the property affected. Companies which have agreed to operate at a 5-cent fare or have accepted franchises with conditions annexed imposing a 5-cent fare, and the investors in the securities of such companies have no just claim to a valuation of their properties without regard to the average earnings which they may reasonably be expected to make in the future at such fare under the conditions which are likely to obtain. Indeed, the true rule of valuation of any property for business purposes is the capitalized value of its prospective earnings under normal conditions. Where such earnings in the case of a public utility are limited by contract or franchise they should be computed and the property affected by them valued according to such limitation. Any other basis of valuation of the traction lines in the City of New York might result in enormous gratuities to the companies at the public expense.
>
> We are dealing with a problem vitally affecting the public welfare, and for that reason alone the exercise of its police power by the state is justified. It is not a question of the rights of the companies, which are fixed by contract or franchise. The problem is to determine what is in the ultimate public interest, how credit can be provided to finance necessary extensions, and to obtain the additional facilities required to render adequate public service, and in the solution of that problem private interests must not be permitted to capitalize the public need.
>
> It is very difficult to prescribe by statute a standard or principle or valuation that will be fair and not too inflexible. I fear that in the absence of any other prescribed standard the statute as it now stands will be construed as contemplating a valuation based on physical values, which, as I have said, may prove to be grossly unfair to the public.
>
> A standard has been proposed which appears to me to be fair and sufficiently flexible to enable the commission to do exact justice while at the same time it safeguards the public interests. That is the standard which has to be employed daily in the conduct of business affairs; namely, the prospective earnings of the business to be valued. Applied to the matter in hand the valuation should be based on the estimated prospective earnings at the fare in each case which the company is permitted to charge under its franchise or contract with the city, the valuation in no case to exceed the original cost or the fair reproduction cost less depreciation of the property necessarily employed in the public service.
>
> ### INCREASED FARES OFTEN REDUCE REVENUE
>
> The fare which any company can charge will, as a practical matter, be limited by what other companies are permitted to charge, and the amount which it is reasonable for the public to pay is also a limiting factor, and it has been found that increased fares often result in a reduction of revenue. Of course, the statute should be flexible enough to permit consideration of all relevant facts and circumstances, such as, for example, the prospect of increased earnings of lines now serving undeveloped territory.
>
> The foregoing principle of valuation will, in my opinion, be fair to the public and to the companies alike, and, with the limitation that the valuation cannot in any case exceed the original cost or the fair reproduction cost less depreciation, it will adequately safeguard the public interest. Of course I construe fair reproduction cost to mean such cost under normal, not abnormal, conditions.
>
> There are other verbal changes needed to limit the discretion of the commission and to define more accurately the jurisdiction of the Transit Commission.

The Governor issued a subsequent message to the press, expanding his ideas as to what he meant by the principle of valuing the properties on the basis of prospective earnings. In this statement he said:

> The principle that I suggest is that the properties shall be valued on the basis of their earnings. Necessarily these must be prospective earnings, because that is the way you value all property under average conditions, conditions that are liable to obtain in the future, at the fare they have agreed to take.
>
> ### A CONTRACT IS A CONTRACT
>
> Here is the proposition. These contracts were made, and I think a contract is a contract. Now it is claimed that emergency conditions have existed under which an unusual situation is presented. Undoubtedly there is an emergency existing in transit in the City of New York at the present time. Nobody doubts that. Now, some just basis or principle of valuation must be hit upon if some comprehensive scheme is worked out. My principle is that these properties shall be valued at what they will earn at the stipulated fare under conditions that are likely to obtain, not under abnormal conditions.

Asked if a change in the fare for one company in New York City meant that all the railway companies would have to have the same fare, the Governor said:

> It would ordinarily appear that if a company had a fare different from that at which another company could carry passengers between the same points it would not get any passengers if its fare was less advantageous to those who travel. If the surface lines had a higher fare than the elevated or subways everybody would ride on the elevated or subway. We are going to have a commission to work that out.

In response to the Governor's urging the Legislature passed amendments to the Public Service Commission law so that the Transit Commission in New York City shall have jurisdiction and supervision over all railroads, street railroads and stage or omnibus lines or routes, and to persons or corporations owning, leasing or operating such lines which lie wholly or in part within the corporate limits of New York City. The general State Commission, however, shall have jurisdiction over construction, maintenance, terminal facilities, stations, etc., outside of New York City.

There is thus created a sort of joint jurisdiction over lines operating across the city lines. The Transit Commission also has jurisdiction over all holding corporations or persons which hold the majority of the stock of a corporation subject to the jurisdiction of the Transit Commission in respect of the relations between such corporation and the holding company or person.

The most important changes in the law, however, are that the Transit Commission is given power to regulate construction, maintenance, stationary equipment, terminal facilities, stations and local transportation facilities of street railroads, or stage or omnibus lines or routes within the City of New York, as well as to regulate operation and fares, and the provision which makes mandatory instead of permissive the things the commission shall do and consider in the hearing for increased fares, and that

> The commission shall, with due regard among other things to the estimated prospective earning capacity of such property at the rate of fare at the time fixed and existent, and to a reasonable average return upon the value of the property actually used in the public service, and to the necessity of making reservation out of the income for surplus and contingencies, determine the just and reasonable rates, fares and charges to be thereafter observed and inforced as the maximum to be charged for the service to be performed, notwithstanding that a higher or lower rate, fare or charge has been heretofore prescribed by general or special statutes, contract, grant, franchise condition, consent or other agreements,

and finally, in connection with the valuation of the property to be made,

> Such valuation shall be made with due regard to the estimated prospective earning capacity of the property necessarily used in the public service at the rate or rates of fare of the company prior to the taking effect of this act was entitled to charge, in view of the provisions of the contract or franchise under which the property is operated or held, or of any lawful order in force, fixing or regulating rates or fares and of the competition of other lines and with due regard to all other pertinent facts and conditions; but such valuation shall not in any case exceed the fair reconstruction cost of the property less depreciation. Such valuation shall be in such detail and shall include such elements of cost or values and shall be made in such manner as the commission may prescribe. Such valuation as finally determined by the commission shall be the basis for all allowances to the railroad companies under the plan and for thereafter fixing the returns on the property so valued, anything in this chapter to the contrary notwithstanding.

One other modification of interest is that in the plan of readjustment which the Transit Commission shall make, of the four purposes which were originally included, the following is now eliminated:

> The readjustment of the existing rights and obligations of the railroad companies so that the real values in the railroads may be protected and securities stabilized.

Poor Showing Up State

New York State Railways and Schenectady Railway Fail to Earn Sufficient to Pay a Return

For the year 1920 the New York State Railways reports earnings of but $1.75 per share of stock outstanding as against $1.43 the previous year. On Aug. 1 a service-at-cost contract became effective with the city of Rochester for a term of ten years. This contract provides for an annual return, ranging from 6 to 8 per cent upon the base value of the property used in serving the Rochester city lines, tentatively appraised at $17,500,000.

In Schenectady net income decreased 28.2 per cent, leaving but $32,851 with which to pay dividends on $4,100,000 of outstanding stock. The accompanying table shows the results of operation for the last two years for both the New York State Railways and the Schenectady Railway.

INCOME ACCOUNT — NEW YORK STATE RAILWAYS AND SCHENECTADY RAILWAY

	New York State Railways			Schenectady Railway		
Item	1920	1919	Per Cent Change	1920	1919	Per Cent Change
Railway operating revenues	$10,454,410	$9,406,473	11.1	$1,905,313	$1,664,282	14.5
Operating expenses (*a*)	8,369,558	7,134,491	17.3	1,629,966	1,380,325	18.1
Net revenue railway operations	$2,084,852	$2,271.982	—8.3	$275,346	$283,957	—3.0
Net revenue auxiliary operations	2,631	562	567.5	....	....	.....
Net operating revenue	$2,087,483	$2,271,420	—8.1	$275,346	$283,957	—3.0
Taxes	621,173	602,869	3.0	94,072	90,683	3.7
Operating income	$1,466,310	$1,668,550	-12.1	$181,274	$193,274	—6.2
Non-operating income	300,041	37,473	700.3	1,512	3,913	—61.4
Gross income	$1,766,351	$1,706,023	3.5	$182,786	$197,187	—7.3
Deductions	1,336,671	1,361,816	—1.8	149,935	151,484	—1.0
Net income	$429,680	$344,207	24.8	$32,851	$45,703	—28.2
Sinking fund appropriations	32,633	31,641	3.1	....	....	.....
Surplus	$397,047	$312,566	27.0	....	....	.....
Undivided earnings of other companies	21,075	27,699	—23.8	....	....	.....
Total for dividends	$418,122	$340,265	22.8	$32,851	$45,703	—28.2

(*a*) Including depreciation and deferred maintenance accrual.

Memphis Doing Better Than Was Anticipated

Commissioner Horace Johnson has pointed out that while the deficit reported by the receivers of the Memphis (Tenn.) Street Railway for the month of February is several thousand dollars in excess of the January deficit, it is $15,290 below the deficit in the estimate prepared by Ross Harris, consulting expert, covering each month for the year 1921. The January deficit was $4,941 below the estimate of Mr. Harris.

Figuring on the basis of operations for previous years and using the other data at his command, Mr. Harris prepared a table for each month of 1921 in which he set out his estimates of items of expense included in cost of service. The report also gives the estimated revenue for each month, the number of revenue passengers and the number of car-miles. By means of his estimates of the total cost of service and the total revenue for each month he arrives at the estimated deficit or surplus for that month. Thus far the company has exceeded Mr. Harris' expectations.

In January, for instance, the estimated deficit was $15,364, while the actual deficit was $10,423. In February, instead of the deficit of $32,560 anticipated by Mr. Harris, the actual deficit for the month was $17,290. Mr. Harris anticipates a surplus for April amounting to $3,350 and for May amounting to $9,147. Deficits of $146 and $1,483 respectively are anticipated for June and July. The figures in Mr. Harris' table would result in the estimated deficits and surpluses for the individual months cancelling each other by the end of the year, thus leaving untouched, however, the deficit of $129,564 with which the receivers entered upon the year 1921.

The deficit at present is in the neighborhood of $157,000. This includes the total deficit of more than $129,500 for the year 1920, together with the January deficit of more than $10,000 and that of February in excess of $17,000. In the event the operations during March, April and May do not come up to expectations and the deficit continues to grow instead of taking a downward trend, the receivers may seek an 8-cent fare.

City Urges Consolidation

The brief filed by Corporation Counsel Geraghty of Spokane, Wash., with the State Public Service Commission in the action of the city to prevent the granting of the 8-cent fare to the Washington Water Power and the Spokane & Eastern Railway & Power Company, says:

> These conditions compel us to the inevitable conclusion that the only solution for the situation, so far as the Spokane & Eastern company lines are concerned, lies in consolidation.
>
> There is no question of confiscation involved here, because this is not a case where the city or the state has attempted by legislation to fix a rate of fare to be charged by the Traction company. It is a case where the company and the city made a contract which at this time has proved unprofitable to one of the parties. Courts and commissions do not, as a matter of law, relieve competent contracting parties from improvident contracts.
>
> Some fanciful difficulties in the way of a consolidation were suggested by the representatives of the two companies at the hearing, but we have no hesitation in saying that if the companies desire in good faith to consolidate the lines no legal impediment will be found growing out of the city's laws. The responsibility for the failure to effect a consolidation must rest upon the companies themselves.

Toledo Traffic Decreases

The net result of March operations of the Community Traction Company, at Toledo, Ohio, under the service-at-cost ordinance, shows a deficit of $73,756, according to the April 11 report made by Commissioner Wilfred E. Cann.

While net earnings from operation show a surplus of $18,854, as compared with $9,998 for February, the daily revenue due to the poor industrial conditions is less by $470 and operating expenses are also $280 less. Fixed charges increased to $92,610 through the raising of the amount paid into the depreciation and maintenance funds and the establishment of an injuries and damages fund.

There is a balance in all of these funds at the end of March of $37,362, which may be deducted from the net deficit in order to compare with the previous month.

The stabilizing fund is now at a level of $313,333, it having developed that only payments for interest on bonds and dividends on preferred stock may be drawn from that fund when revenues do not equal expenses and fixed charges.

Mr. Cann believes that with the elimination of the bus competition on April 21, the rerouting of the Huron-Erie line, the adjustment of wages and new speed schedules savings will accrue which will wipe out the deficit before a fare raise is necessary.

A tentative agreement has been reached with the interurban lines whereby they are to pay a rental of 40 cents a carmile for the use of the city tracks, the overhead and power. This is a 41 per cent increase over what they are now paying on a percentage of gross receipts basis. Under the new contracts revenues, it is estimated, will be increased about $80,000 a year.

During the month 5,710,010 revenue passengers were carried at a deficit of 1.29 cents each. Car-mile operating expenses totaled 41.56 cents against 42.86 during February. Revenue from operation was 42.4 as against 46.5 cents per car mile the previous month. Total for the month was 8.64, compared to 8.98 in the month of February, showing a decrease in traffic of 3.94 per cent.

$400,000 Shrinkage in Louisville in Amount Available for Dividends

The accompanying income statement taken from the annual report of the Louisville (Ky.) Railway shows operations for the year ended Dec. 31, 1920. As operations during the preceding year were much affected by a strike of trainmen, comparative income figures are also shown for 1918, as well as 1919, to give a means of judging the condition of the company as compared with a year more nearly normal than was 1919.

The report also contains a historical sketch of developments leading up to the recent increase in fare from 5 cents to 7 cents as well as the valuation of the property by J. G. White Company details of which have already been printed in these columns from time to time.

INCOME STATEMENT—LOUISVILLE RAILWAY

	1920	1919	1918
Revenue from transportation	$3,962,206	$3,371,567	$3,556,031
Other operating revenues	184,301	165,667	151,658
Total operating revenues	$4,146,507	$3,537,234	$3,707,689
Operating expenses	3,229,187	2,794,439	2,383,972
Net revenue from operations	$917,320	$742,795	$1,323,717
Taxes	366,000	366,000	355,369
Operating income	$551,320	$376,795	$968,348
Non-operating income—			
Lou. & Int. R.R. net income	124,256	$100,000	$84,657
Other non-operating income	2,675	5,297	3,758
Total non-operating income	$126,931	$105,297	$88,415
Gross income	$678,251	$482,092	$1,056,763
Deductions from gross income—			
Interest on bonds and notes	$632,790	$630,920	$627,000
Amortization of discount on notes	9,207	8,677	5,055
Total deductions	$641,998	$639,597	$632,055
Balance available for dividends on stock	$36,253	*$157,505	$424,708

*Defici..

Knoxville Valuation Figures Expected Soon

A decision of the Tennessee Public Utilities Commission relative to the appraised value of the property of the Knoxville Railway & Light Company is expected within the next few days.

The appraisal made by Albert S. Richey, representative of the commission, and J. H. Perkins, representative of the company, was submitted to the commission for its consideration on Dec. 19, 1920. A combination of circumstances has caused a delay in the final outcome. The election came on in Tennessee. The Legislature met and has just adjourned. These took the time of the members and then Mr. Campbell took his seat on the board after the first hearing on the subject of the appraisal and he desired to go over the records thoroughly before casting his vote.

After the commission has made its decision on the value of the property of the traction company, together with its commercial lighting plant, another decision will follow as to whether the company is entitled to a 7-cent fare and 2 cents additional for transfers for which it has petitioned.

The two engineers who signed the report found that the historical value of the plant was $6,234,141 and that the reproduction cost would be $10,362,964. William H. Weiss, the engineer representing the city of Knoxville, refused to sign the majority report, but made a separate report, finding, in his opinion, that the appraisal of the other two engineers was approximately $2,000,000 too high.

Financial News Notes

St. Petersburg Road Doing Well.—The St. Petersburg (Fla) Municipal Railway showed a profit of $10,000 for the month of March, according to Director of Public Utilities R. E. Ludwig. He states the lines will more than earn interest and sinking fund charges this year after taking care of operating expenses and many additions and improvements—including several new one-man cars which have been bought.

Too Soon to Draw Conclusions.—J. P. Barnes, president of the Louisville (Ky.) Railway, is disappointed but not discouraged over the results with the 7-cent fare put into effect there recently. The new fare has hardly been in force long enough to justify the drawing of a general conclusion, but the expected increase of 20 per cent in revenue under the new rate has proved actually to be not more than 10 per cent.

Guaranteed Dividend Being Paid.—Frank Hedley, president of the Interborough Rapid Transit Company, New York, N. Y., on April 14 authorized the following statement: "The dividend due on April 1 to holders of Manhattan Railway stock under the terms of the lease to the Interborough Rapid Transit Company, will be paid in groups, commencing April 15, and payments will continue in accordance with the financial ability of the company. It is anticipated that the entire dividend will be paid within the present month."

Trenton Road Valued at $5,000,000.—The value of the property and business in the service of the public of the Trenton & Mercer County Traction Corporation, Trenton, N. J., has been determined by Ford, Bacon & Davis, engineers, New York, as being $5,000.000. The methods pursued in the valuation were the same as used in the Public Service Railway valuation. The reproduction cost new of the property as a going concern based on Sept. 1, 1920, prices for labor and material is estimated to be $9,391,228. The historical cost built up from the companies, records show a value of $5,335,674.

Foreclosure Sale Set for April 30.—Paul E. Thomas, special master, will offer for sale at Meadville, Pa., on April 30 $300,000 of capital stock of the Meadville, Conneaut Lake & Linesville Street Railway $350,000 capital stock of the Crawford & Erie Railroad, and $145,000 of capital stock of the Peoples Incandescent Light Company, all pledged under the indenture securing the first 5 per cent bonds of the Northwestern Pennsylvania Railway, Meadville, Pa., dated 1911. The securities are to be sold under foreclosure proceedings with a view to consummating the reorganization plans for the properties outlined some time ago.

Assets $1,139,884 Less than Claims.—Robert W. Perkins, receiver of the Shore Line Electric Railway, Norwich, Conn., has filed with the clerk of the Superior Court his appraisal of the property as of Feb. 1, 1921, and a report of operations for fifteen months of the receivership. Portions of the road have been sold and dismantled. The appraisal of road and equipment is $2,451,965. The receiver's report shows that on the entire system there was an operating deficit of $52,227 for fifteen months up to Dec. 31, 1920, to which January of this year added an operating deficit of $3,749 and February of $6,112, making a total to March 1 of $62,089. The difference between tangible assets and preferred claims is $1,139,884.

Distribution Provided in Reorganization.—The Western Pacific Railroad on April 11 was authorized by the California Railroad Commission to issue and sell at 85 and accrued interest $4,180,000 of its first mortgage 5 per cent bonds. The bonds will be acquired by the Western Pacific Railroad Corporation and then distributed to bondholders of Sacramento Northern Railroad who have agreed to sell their bonds to the Western Pacific. The Western Pacific has offered to pay $27.50 a share for the first preferred stock, $15 a share for the second preferred and $6 a share for the common. It has also offered to exchange for the bonds of the Sacramento Northern first mortgage bonds of the Western Pacific on the basis of $80 face value of the Western Pacific bonds for $100 face value of Sacramento Northern bonds.

Traffic and Transportation

Six Cents in Indianapolis

Basic Five-Cent Fare Preserved Under Ticket Ruling—One Cent for Transfer

A cash fare of 6 cents, twenty tickets for $1 and 1 cent for a transfer were authorized by the Public Service Commission of Indiana on April 15 in passing on the petition of the Indianapolis Street Railway for higher fare and more revenue. Under the order those who buy tickets will pay the same fare as they have been paying recently. The 1-cent charge for a transfer was continued by the commission's denying the company's petition for a 2-cent transfer charge. The company's request for a 6-cent cash fare and twenty tickets for $1 is granted. The commission feels that under the order 5 cents is preserved as the basic fare. The order took effect at 12.01 o'clock a.m. on April 18.

John W. McCardle, a member of the commission, dissented in a brief statement as follows:

> I must dissent from the relief granted for the reason that I do not believe it will provide the revenue that is necessary.

Commissioners Lewis, Van Auken, Barnard and Johnson concurred in the order.

The order is temporary. It says:

> That the commission continue consideration of the prayer of petitioner for an extra 1-cent transfer charge, pending a period of thirty days, in which there shall be determined the effect, in percentages, of patrons paying cash fares and traveling on tickets, of the fares hereinbefore authorized, but the commission reserves the right to pass on the matter of the prayer for an additional charge of 1 cent for transfers at any time if it should be conclusively shown that the percentage of patrons paying cash fares is so small as to nullify the relief which the commission herein seeks to provide.

The order also directs that within the next month

> The Indianapolis Street Railway and the interurban railroads, which are parties to this order, bring before the commission for final conclusion all matters pertaining to the carrying out of plans filed with the commission in conformity with its order of Dec. 18, 1920, for the remedying of inadequacy of interurban freight terminals in the city of Indianapolis, to the end that said matters may be brought to an early conclusion.

The local company, which has provided freight terminal facilities, recently made an agreement with the interurban companies by which the latter are to take over and develop the Kentucky Avenue freight terminal site. The agreement, before becoming effective, must be approved by the Public Service Commission, and this matter is to come before the commission soon.

Ferdinand Winter, attorney for the company, declared recently in a reply brief filed with the commission:

> The railway does not claim that there is anything in any order of the commission that obligates the commission to provide rates of fare that will enable it to pay dividends upon its preferred stock. It does claim, however, that the public has no right to the use of its property except by the payment of rates which will afford a reasonable return upon the value of such property, and that, as the commercial rate of interest ranges from 7 to 8 per cent such reasonable return should be at least 7 per cent, after payment of all operating expenses, including the sum set apart by the commission for maintenance and repairs and all taxes.

The brief continued by pointing out that the company understood the commission had set 7 per cent as a fair return, but that the company was asking for much less than this amount.. It pointed out that the value of the property as fixed by the State tax board was $16,500,000 and that the value of the property as tentatively fixed by the commission, including recent improvements and additions, was approximately $16,000,000. It also showed that 7 per cent of this sum was $1,120,000 and that the proposed net earnings of the company would be only $891,237. This would be further reduced by $52,796, representing the difference between an overestimate of estimates of receipts from cash fares and an underestimate of expected receipts from transfers.

Eight-Cent Fare in Syracuse

The New York State Railways, is authorized to charge an 8-cent cash fare, with four tickets for 29 cents, on its Syracuse lines under a decision handed down by the Public Service Commission for the Second District of New York on April 19. The new rate is authorized to go into effect on three days' notice.

Determination of the commission was announced following a long executive session in which a report of Commissioner Joseph A. Kellogg, who heard the case, was discussed at length.

The company asked for a 10-cent fare. It has been charging 6 cents.

Opposing the application, Corporation Counsel E. H. Lewis argued that a 7-cent fare, with four tickets for 25 cents, would be adequate.

The increased fare is granted for a period of six months and will continue thereafter until a further order of the commission.

The valuation fixed by the commission on the property was $8,922,728. The company claimed a valuation of $21,500,000. The city put in figures, prepared by Milo R. Maltbie, expert, showing a valuation of $5,121,453.

The Mayor's commission, which recommended a service at cost agreement, placed the valuation at $12,415,000.

The fare for children may be increased from 3 to 4 cents, the commission decided.

No other changes in the charter, newspaper rate, or other rules and regulations is permitted under the order.

Preferential Fares Raised

I. C. C. Over-rules Intrastate Franchise Fare on Ohio Lines of Wheeling Traction Company

Certain intrastate fares of the Wheeling (W. Va.) Traction Company were found to be preferential to intrastate passengers while prejudicial to interstate passengers in a decision handed down by the Interstate Commerce Commission in the case of Beall vs. Wheeling Traction Company. Discriminations arose because interstate passenger fares were higher than the fares between points within the State of Ohio. The intrastate fares in certain Ohio cities where the road operates were inadequate and could not be raised because of franchise requirements.

There were two complaints brought by citizens of Wheeling and Wellsburg, W. Va., the circumstances of which were so nearly identical that they were consolidated and disposed of in one report by the commission. To cite one case will be sufficient.

Wheeling, W. Va., and Bridgeport, Ohio, on opposite sides of the Ohio River, are connected by bridges. The distance from Wheeling to Bridgeport, Ohio, is 1.5 miles, to Martin's Ferry, Ohio, 5.72 miles, and to Bellaire, Ohio, 8.16 miles. The intrastate fare between Martin's Ferry and Bellaire, a distance of 8.94 miles, is 5 cents. The interstate fares from Wheeling to Bellaire, 8.16 miles, and from Wheeling to Martin's Ferry, 5.72 miles, at the date of hearing were each 10 cents. Subsequently they were increased to a cash fare of 12 cents and a ticket fare of 10 cents between Martin's Ferry and Wheeling and a cash fare of 16 cents and a ticket fare of 13⅓ cents between Bellaire and Wheeling. The transportation conditions under which the three movements are made are similar. The entire intrastate journey is made upon cars operated in interstate commerce since no through cars are operated between Bellaire and Martin's Ferry and intrastate passengers are required to transfer at Bridgeport from and to cars operated in interstate commerce.

Under the terms of the franchise granted it by the city of Martin's Ferry, the traction company may not charge more than 5 cents between Martin's Ferry and Bellaire, a distance of 8.94 miles. The Public Utilities Commission of Ohio permits the company to charge 10 cents between Bellaire and Bridgeport, a distance of 5.7 miles, the passenger in the latter journey traveling over the same rails in the same car as the Bellaire-Martin's Ferry passenger. A passenger boarding a car at Bellaire who states his destination as Martin's Ferry pays but 5 cents and is given a transfer to be used at Bridgeport. One who states his destination as Bridgeport, 3 miles less distant than to Martin's Ferry and over the same rails, must pay 10 cents. The practical result is that the traction company cannot make use of the authority granted it by the Public Utilities Commission of Ohio to charge 10 cents from Bellaire to Bridgeport because passengers to the latter point invariably escape the higher fare by stating their destination as Martin's Ferry. The same situation prevails with respect to travel from Martin's Ferry to Bellaire.

The commission regarded the interstate fares as reasonable and the intrastate fare of 5 cents between Martin's Ferry and Bellaire unduly low and ordered the Wheeling Traction Company to "desist from practicing the undue prejudice, preference and advantage and unjust discrimination." For this intrastate line the commission set the rate of fare at 16 cents cash or 13⅓ cents when tickets are purchased.

John E. Benton, General Solicitor for the National Association of Railway & Utility Commissioners, announced on April 14 that the association looked upon the decision at Wheeling as assumption by the Interstate Commerce Commission of jurisdiction enabling it to prescribe intrastate rates for the purpose of increasing the revenues of city railways. He said the decision would be contested. Mr. Benton is quoted as follows:

> The possible far reaching effect of the decision in offering opportunity to street railway carriers of that charter to secure revision of rates now limited by franchises, even though their lines be wholly intrastate, is evident.
>
> The possible consequences of this decision, if adhered to, and sustained by the courts, are obvious even without suggestion. Inasmuch as every street railway that connects with another which is interstate can easily become an interstate carrier, it may be said to rest with such carriers, of the class described in this case, to bring themselves under the jurisdiction of the Federal commission whenever they desire to do so.
>
> If the order of the commission in the Wheeling Traction Company case stands, it is evident that as to a large part of existing street railway lines, final power of rate regulation has passed from the states to the Federal commission.
>
> If the commission has jurisdiction to declare intrastate interurban fares discriminatory on the ground that it injures an interstate carrier to lose money—and hence interstate commerce—it would seem certain that it hurts just as much to lose it in the city as in the country.
>
> If may be regarded as certain that street railroads which come within the rule as finally laid down will speedily create situations which will call for the extension to their full limits of the principles involved in the decisions made accordingly, if the Wheeling decision stands, busy days would seem to be ahead for the Federal commission.

Jitney Ordinance Upheld

A court order of April 12 at Davenport, Ia., continued in force a temporary injunction under which operation of jitney buses on the public streets is prohibited. The court held that a "jitney bus is an automobile competing with a street railway company for business on the public streets." The jitney men's attorneys sought to prove that their clients were not jitney bus drivers but taxi cab proprietors and as such had the same right as any taxi-cab to operation on the streets. This decision forces the bus men to take out bonds and in other ways conform to the jitney bus ordinance now on the city's books.

Iowa Rate Cases Decided

U. S. Supreme Court Declares Confiscatory Rate in Ordinance Cannot Be Enforced

When the Supreme Court of the United States handed down its opinion on April 11 on the rate case of the San Antonio Public Service Company it rendered also an opinion in three cases of lighting rates in Iowa. The San Antonio decision, as abstracted in this paper for last week, upheld the position of the railway because the court held that the city did not have power to establish a rate of 5 cents. The Iowa cases were decided in favor of the utilities upon very similar grounds. In passing upon them the court said that the statute forbade the cities from making contracts regarding rates.

The cases were Southern Iowa Electric Company vs. City of Chariton; Iowa Electric Company vs. City of Fairfield, and Muscatine Lighting Company vs. City of Muscatine.

In its decision in the lighting rate cases the Supreme Court says:

> Two proposition are indisputable: (a) That although the governmental agencies having authority to deal with the subject may fix and enforce reasonable rates to be paid public utility corporations for the services by them rendered, that power does not include the right to fix rates that are so low as to be confiscatory of the property of such companies. . . . and (b) that where, however, the public service corporations and the governmental agencies dealing with them have power to contract as to rates and exert that power by fixing by contract rates to govern during a particular time the enforcement of such rates is controlled by the obligation resulting from the contract, and therefore the question of whether such rates are confiscatory becomes immaterial.

In the three cases in question the court held that a contract did not exist in the case of the Iowa cities, and it quoted comments on this subject by the Supreme Court of Iowa. A portion of this quotation follows:

> There was a time in the history of our legislation when the right of contract as to rates was conferred by statute upon the city councils. . . . By the revision and codification of 1897 the right of contract as to rates for utilities of this character was entirely eliminated, and the legislative power to regulate rates was conferred upon the city council in all cases. The reason for the change of method is obvious enough. Under the contract method the rights of the public were often bartered away, either ignorantly or corruptly, and utility corporations became empowered through the contractural obligations to enforce extortionate rates. The net result of the progressive legislation is found in our present section 725 whereby it is forbidden to any existing city council to bind the city to any rate for any future time. The power of regulating the rate is always in the present city council. It must be said, therefore, that the rates fixed by section 6 of the ordinance hereinbefore referred to were not fixed by contract.

In another case the Supreme Court of Iowa says, in referring to section 725 of the Code of 1897:

> That statute in positive terms forbids any abridgement of the right to regulate and fix charges of service corporations named in the statute, either by ordinance, resolution or contract. No one would now contend, in the teeth of the statute prohibition, that there can be a valid contract fixing permanent rates. As to corporations named in that statute, we have held repeatedly that there can be no contracting that rates fixed for service cannot be changed.

In commenting on this situation the Supreme Court of the United States says:

> The total want of power of the municipalities herein questioned to contract for rates which are thus established and the state public policy upon which the prohibtion against the existence of such authority rests, absolutely excludes the existence of the right to enforce, as the result of the obligation of a contract, the concededly confiscatory rates which are involved, and therefore conclusively demonstrate the error committed below in enforcing such rates upon the theory of the existence of a contract.

Spokane Fare Case Concluded

The Washington State Public Service Commission has heard the applications of the Washington Water Power Company and the Spokane Traction Company for permission to increase fares in Spokane from 6 cents to 8 cents. Statistics and estimates submitted by the companies included:

> Washington Water Power Company—Earnings for 1920, $1,082,760. Estimated earnings for 1921 (with 8-cent fare), $1,364,480. Increase, $281,720. Annual depreciation or replacement reserve, $174,600. Appraisal of property and working capital, $4,966,687. Eight-cent fare will yield 8.5 per cent. Present 6-cent fare yield, 2.82 per cent.
>
> Traction Company—Appraisal, property and working capital, $2,059,569. Eight-cent fare will earn (estimated), $606,177. Net income for the company (estimated), $60,863. Yield, 3 per cent.

Outstanding features of the hearing, in nutshell form, were:

Attorney Post for Washington Water Power Company requested that permission be granted to amend its complaint and ask for a 10-cent fare in the event that the city releases jitneys.

The city revived its suggestion for a merger of the two railway systems as the only solution of the fare problem.

The Public Service Commission engineer estimated a loss of 5 per cent in travel if the 8-cent fare is adopted. The Washington Water Power Company placed its estimate of loss in travel at 8 per cent. The commission's engineer valued the lines of water power company at $400,000 more than was claimed by the company.

If an 8-cent fare is granted the Washington Water Power Company will add $26,000 a year to the payroll of its trainmen by shortening the working day. It will also increase its charge for power for the railway from $90,000 to $180,000 a year.

Strike Emergency Over, Jitneys Must Go

Supreme Court Justice Hinman at Albany N. Y., on April 15 granted a request made by Harry B. Weatherwax, as a citizen and resident, that Mayor Watt clear the streets of the motor buses and jitneys which have carried the bulk of traffic in Albany and its suburbs since the trainmen of the United Traction Company struck on Jan. 29. The Court issued a writ of mandamus to compel the Mayor, through the police, to enforce the provisions of the transportation corporation law, which prohibits a bus line from operating without its owner first obtaining a permit from the city and a certificate of necessity from the Public Service Commission. Mr. Weatherwax is vice president and general manager of the United Traction Company.

Injunction Prevents Fare Increase in Cincinnati

The possibility of another "half-cent" increase in fare by the Cincinnati (Ohio) Traction Company on May 1 was defeated temporarily during the week ended April 16, when Judge Stanley Struble granted an injunction enjoining the company from taking such action. In the suit filed by City Solicitor Saul Zielonka and William J. Kuertz, assistant city solicitor, it was said that the company had reported a deficit in its operations for February and March. William C. Culkins, Street Railway Director, investigated the reported deficit and found that there was no real deficit, but that the methods which the company employed in keeping its books were responsible for the unfavorable report for February and March. A similar injunction was issued by Judge Stanley Matthews two months ago, after a suit had been filed by the city solicitor setting forth the same claims. It was only a temporary injunction as was the one issued last week.

Zoning Plan Continued in Westchester

An order holding that it is "unreasonable" to require the Westchester Electric Railroad, the New York, Westchester & Connecticut Traction Company and the Yonkers Railroad to transport passengers between points in different municipalities for a single 5-cent fare was issued on April 8 by the Public Service Commission, Second District.

The order permits the three lines to continue to collect fares on the basis of the present zoning system for the transportation of all passengers in Westchester County.

Franchise fare restrictions were waived in April, 1919, for two years and these waivers are about to expire. They permitted collection of fares by zones, generally each municipality constituting a zone.

The order of April 8 continuing the zoning system was granted on the application of the operating companies.

Re-Routing Considered in Milwaukee

Plans for re-routing a number of the city lines of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., passing through the down-town district of Milwaukee were discussed at a hearing held by the Wisconsin Railroad Commission in Milwaukee on March 22. At the conclusion of the hearing, the company was given until April 1 to analyze the different re-routing schemes suggested and to formulate a plan of its own. The commission will hold another hearing about April 15.

The hearing was held as a result of a recent decision of the commission ordering the joint use of tracks on Wells Street by the Milwaukee Northern Railway, the Chicago, North Shore & Milwaukee and the Milwaukee Electric Railway & Light Company.

Ten-Cent Case Presented

Hearing Well Under Way on Appeal of Public Service Railway for Increased Rate

Thomas N. McCarter, president of the Public Service Railway, Newark, N. J., said on April 11 that his company had no objection to the valuation by Ford, Bacon & Davis, just made public, being included in the pending fare case although the officers of the company felt that the figures of increased expenditure by the company were sufficient in themselves to justify the 10-cent fare. The hearing on the appeal of the company for increased rate had then been under way for about a week. Mr. McCarter also agreed to a further suspension of the proposed 10-cent rate until July 15.

For the commission, Mr. Osborne, who sat in place of President Treacy, said that the commission felt it was only fair to all parties concerned to express its views now in order that the least time possible might be lost. If the valuation was to be considered at all—now or at a later date—it might better be included in the present proceedings and the whole thing disposed of for all time. The commission wanted to settle the matter. If the question of valuation was to come up later, the time taken in the present proceeding was being wasted.

At a previous session of the present hearing Mr. McCarter startled his auditors by saying that the company had not come before the board before for relief because the commission did not want the company to ask for higher fares. He was referring to the commission which the present board has succeeded. He is reported to have said:

> We heard that the board did not want to hear any more applications for increases in 1920. However, we made the application in December because we decided we needed the higher fare, whether or not the board wanted to pass on the matter.

Mr. McCarter regarded it as an amazing spectacle to see Mr. Record, counsel for the municipalities which are opposing the increased fare, criticizing him for not asking for an increased rate.

Another witness for the company has been Richard E. Danforth, vice-president in charge of the railway. The tenor of his argument was that the 10-cent fare was reasonable and all that the traffic would bear. It took no greater proportion of the worker's income now than a 5-cent fare took in 1916. Mr. Danforth admitted that the public used jitneys because they liked automobiles, desired speed and disliked the railway corporation. He was unwilling to admit, however, that the growth of the jitney business was a consequence of the failure of the railway adequately to meet transportation needs.

The hearing will be resumed on April 22 with the presentation of testimony in the interests of the municipalities.

Eight Cents in Poughkeepsie

The Public Service Commission for the Second District, has granted permission to the Poughkeepsie & Wappingers Falls Railway, Poughkeepsie, N. Y., to charge an 8-cent fare. Commissioner Kellogg, in a memorandum accompanying the order, said:

> It would seem that in a city located as is Poughkeepsie, where walking is under ordinary conditions permissible an increase in fare of such a substantial nature, especially one that arouses the antagonism of the people, would result in a very substantial falling off in the number of passengers carried. It is not probable that the slight increase authorized will diminish the fare paying passengers to any appreciable extent.

Mr. Kellogg said further that the company had never made a fair return on its investment. In the event that downward prices would affect and reduce operating expenses it is hoped that the company will promptly reduce the fare to a proper level. The old fare was 7 cents. When the company petitioned for a 10-cent fare the public protested against the proposed increase by organizing walking clubs with the slogan "We Walk."

Bamberger Electric Petition Denied

The Public Utilities Commission of Utah has refused to grant increases in passenger fares asked for by the Bamberger Electric Railroad, except that 1,000-mile mileage books may be increased from 2 to 2¼ cents a mile, and that the increase of one-tenth of a cent may be permitted to students' rates.

The rate on the 500-mile book remains at 2 cents a mile. Unlike the 1,000-mile book, the 500-mile book is not interchangeable with other lines. The new student rate is 1.1 cent a mile, but observance of the 5-cent minimum is required in all cases where the per mile fare amounts to less than 5 cents.

The 2¼-cent rate will not materially increase the revenue of the Bamberger line, the commission notes, but will materially simplify auditing as between the company and connecting lines, and for that reason this request was granted.

The company had asked for increases all along the line in its passenger fares, as well as certain increases in its freight tariffs. The latter were disposed of Dec. 31 last, when certain increases were permitted.

On the policy under which increases may be allowed, the commission makes this comment:

> The commission is of the opinion that the assumption is fundamentally wrong that the assumption that this petitioner should be granted the same scale of passenger fares in effect on connecting electric lines, in order to establish and maintain a parity of rates, in that it leaves out of consideration the important element of the cost of service. This petitioner's line connects the two largest cities of the state and traverses a territory with relatively dense population. Moreover, there is considerable interline traffic, and this petitioner, being the middle, or connecting link in the chain of electric roads that reaches from Payson, Utah, to Preston, Idaho, tapping and serving the rich central valleys of Utah, necessarily profits by its advantageous location, because the other lines act as feeders and supply it with

both freight and passenger traffic. The volume of traffic is, therefore, much heavier than is enjoyed by either of the connecting lines.

The above comment explains the commission's attitude that the mere fact that other electric railroads in Utah have been permitted increased passenger rates does not of itself justify the granting of an increase to the Bamberger Electric.

Jitneys Under State Control in Connecticut

Jitney control in Connecticut is now in the hands of the Public Utilities Commission. Although the new jitney regulation bill became effective on April 15 when the signature of Governor Everett J. Lake was affixed, there is a provision which states that no certificate shall be valid until ninety days after the act becomes a law. This will be July 15. It will then be mandatory for all persons or corporations operating automobiles as jitneys to apply to the Public Utilities Commission for a certificate and satisfy the requirements of the law.

Jitneys are defined in the bill as any autos carrying passengers for hire, operating over regular routes or in any manner resembling the service rendered by electric railways. Rules governing fees, routes and continuity of service that apply to all common carriers must be observed by the jitneys.

Applicants for certificates must first show the public necessity for such service over the route proposed, must outline the route in detail and state the character of service proposed. It is provided that hearings by the Public Utilities Commission will be held in the town where the applicant resides or proposes to render service and states that the mayor, selectmen or chief officials of such a town shall be notified to attend the hearing.

To Connecticut's motor vehicle commissioner will fall the duty of licensing and registering drivers of jitneys. Violation of any of the terms of the act will be punishable by a fine of not more than $100 or a jail sentence of not more than sixty days, or both.

Power to make future rules and regulations regarding the operation of jitneys within the State is vested in the Public Utilities Commission.

Wants Higher Fare.—J. J. Coleman, general manager of the Scranton (Pa.) Railway, recently appeared before the City Council at the request of the latter to explain why much-needed improvements to the system have not been made. Mr. Coleman pleaded for a higher fare claiming that extensive improvements could not be undertaken without money and the issuing of securities appeared out of the question. Last year the railway lost $47,340. By figuring in the company's estimated maintenance expense of $200,000 for this year the total expenditures, including the improvements, would run to $650,122.

New Orleans Railway Cites San Antonio Case

Judge Rufus E. Foster, of the Federal District Court at New Orleans, La., upon whose decision Receiver O'Keefe, of the New Orleans Railway & Light Company, was to accept or reject the ordinance adopted by the Commission Council on April 11 cutting fare from 8 cents to 7½ cents, has rejected the action of the Commission Council and has refused to approve the reduction.

Under instructions from Judge Foster, Receiver O'Keefe applied to the court for an injunction. The case was set for hearing on April 18. The proposed fare reduction was to have become effective on April 22.

The receiver alleged in his petition, which followed his refusal to accept the new rate of fare named in the ordinance, that the fare of 8 cents fixed by the Commission Council was confiscatory since it enabled the company to collect only 2 per cent per annum on the property, said by him to be worth $29,000,000, and that the Federal Court alone could determine whether or not an 8-cent fare was required to operate the railway system.

In asking permission of the Federal Court to reject the requirements of the ordinance reducing the fare from 8 cents to 7½ cents the receiver referred to the recent decision of the U. S. Supreme Court in the San Antonio suit, wherein the city was enjoined from enforcing a 5-cent fare with universal transfers. Following the lead of the company at San Antonio Receiver O'Keefe alleged that the 5-cent fare established on the New Orleans lines was a regulatory rate and not contractual.

Youngstown Jitneys Curbed

Jitneys at Youngstown, Ohio, are to be regulated. This is made so by a decision of the Court of Appeals for the Seventh Judicial District of Ohio that a regulatory ordinance passed Feb. 25, 1920, is constitutional, excepting for a few minor requirements.

The city was enjoined from enforcing the ordinance soon after its enactment, a group of jitney drivers attacking provisions requiring bonds, license fees, citizenship of drivers and the like. Their contentions were upheld in part by the Court of Common Pleas and the case was taken to the Court of Appeals. The decision of that body has now permitted the city to enforce the regulatory ordinance.

The ordinance requires that all operators of jitneys be American citizens, that each owner must provide a $5,000 bond for liability for personal injuries and a like bond for damage to property; that each owner must pay an annual license fee of $10 and each driver a license fee of $5. Each bus must be lighted in the interior and none is to carry passengers on the running boards or more than two in excess of the seating capacity. All owners or drivers must be more than twenty-one years old. Penalties for violation are a fine of not more than $100 or six months imprisonment for each offense. In the discretion of the court, any license may be forfeited upon a third offense.

The ordinance originally provided that every owner or driver must have been a resident of the city for at least six months; that every bus must give at least sixteen hours' continuous service and that it must operate over designated routes only. These provisions were declared unreasonable and invalid by the Court of Appeals.

Dallas Asked to Play Fair

The application of the Dallas (Tex.) Railway for authority to increase fares in Dallas from 6 cents to 7 cents is still under investigation by the City Commission. The company at first sought a straight service-at-cost franchise with a sliding scale and guarantee of 7 per cent on the agreed investment. This was refused by the City Commission. The company then applied for authority to increase fares to 7 cents, under the plea that the 6-cent fare now being charged is inadequate. Hearings were begun on Feb. 3 before the City Commission on the application.

At a recent hearing before the City Commission, Jack Beall, chief counsel for the company, made a plea for an immediate decision on the application, declaring that if the city declined to grant the increase, only one course lay open to the company—to go into the Federal Court and seek relief there on the ground that the present fares are unreasonable and confiscatory.

At the conclusion of a hearing at which J. F. Strickland, president of the company, was present, Mr. Strickland told the commission that, while he regarded the 7-cent fare as absolutely necessary to the continued successful operation of the lines, the company would accept a fare of four tickets for 25 cents, with a fare of 7 cents if paid in cash. This advance, he estimated, would mean an increase of between 4 and 5 per cent in the gross receipts of the company.

C. W. Hobson of the Southwest General Electric Company, who, with Mr. Strickland, was granted the franchise in 1917, was also a witness before the commission in the fare investigation. Mr. Hobson declared that the Dallas Railway had paid no dividend on its stock under the present franchise. Mr Hobson said that he and Mr. Strickland were granted the franchise about the time the United States declared war and were reluctant to accept, knowing the inevitable consequence of the war. He said that they took the full ninety days allowed by the Board of Commissioners to accept, and did so then only in the hope of solving the railway problem for Dallas. Mr. Hobson said that every commitment made by the company when the franchise was accepted has been or will be carried out before May 1.

Transportation News Notes

Car Cards Quote This Paper.—A poster now being displayed in the cars of the Virginia Railway & Power Company of Norfolk reads: "The City Council of Kansas City, Mo., passed an ordinance on March 21 prohibiting jitneys from operating on streets where electric railways now operate. The Mayor signed the order on March 22. New routes must now be assigned away from car lines. — ELECTRIC RAILWAY JOURNAL."

Ten-Cent Fare in Ossining.—An order has just been issued by the Public Service Commission for the Second District of New York permitting the Hudson River & Eastern Traction Company operating in Ossining to advance its fare from 8 cents to 10 cents because the commission finds the road "performs more nearly the services of an elevator." The longest line is not more than 2 miles. The grades are very steep.

Chicago Fares Before Supreme Court.—The fight of the city of Chicago against increased fares of the Chicago Surface Lines was carried to the United States Supreme Court on April 13 when the appeal from the decision of the Illinois Supreme Court was filed in Washington. This is the case involving the jurisdiction of the Public Service Commission of Illinois, which on Aug. 6, 1919, allowed an increase in rates from 5 cents to 7 cents. Later the fare was increased to 8 cents.

Fares Come Down in Quincy.—An announcement made in Quincy, Mass., on April 14 by the home rule committee of the Eastern Massachusetts Street Railway stated that a reduction of the fares there will go into effect within a short time. This decision came as the result of a conference held a few days ago with the trustees of the railway. The committee announced that the recommendation of the home rule committee of Quincy that the number of rides per dollar be increased from thirteen to fifteen had been accepted, as it was stated the financial condition of the Quincy division warranted such reduction.

Skip-Stop System Defended—In reply to an attack by a Milwaukee women's organization on the skip-stop system of operation in the city, E. J. Steinberg, resident engineer of the Wisconsin Railroad Commission in Milwaukee, is reported to have stated: "The commission holds that where streets are less than 440 ft. apart, every other stop can reasonably be eliminated. The majority of streets in Milwaukee are less than 440 ft. apart. There are 175 streets in the city less than 340 ft. apart; more than 200 are 380 ft. apart; 75 are 510 ft. apart, and 95 are 660 ft. apart. These constitute the greatest number of car line crossings in the city."

Nine Cents in St. Joseph.—The Public Service Commission of Missouri on April 9 denied the application of the St. Joseph Railway, Light, Heat & Power Company for a straight 10-cent fare. The commission permitted the company to charge a cash fare of 9 cents, or a ticket fare of three for 25 cents, for adult passengers, and 4 cents for children. The increase became effective on April 20. It was in connection with the controversy over fares in St. Joseph that the Federal court at Kansas City, Mo., last November ruled that wrong methods had been used by the commission in valuing the company's property. The court considered the present fair value as the correct value for rate making.

Injunction Prevents Fare Action by Commission.—Fred E. Allen and W. H. Sawyer, receivers for the Alton Granite and St. Louis Traction Company, Alton, Ill., on April 2 obtained from Judge English of the U. S. District Court an injunction restraining the Illinois Utilities Commission from interfering with a proposed increase in street car fares in Alton. A case known as the 10-cent carfare case now before the commission cannot be decided until Judge English dissolves the injunction, which the city of Alton will make every effort to have dissolved. The present fare is 8 cents cash, with 7 tickets for 50 cents. The higher fare for the Alton street car system will probably be 10 cents cash with a ticket rate of eleven or twelve for a dollar. The company, tired of waiting for a decision on its 10-cent fare case, acted to hasten the fare increase.

Special Depot Car in Terre Haute.—A novel addition has been started to the street car service of the Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind. A special car is now run between the union depot and the Deming Hotel only. This car operates without schedule, the plan being to make immediate service available at the station upon the arrival of any train. If one of the regular cars operating on this line is at hand to take care of the travelers this special car waits until another train arrives, unless it should happen that a second car is necessary to accommodate all incoming people. In addition to making immediate car service available for all persons arriving in the city this special car will also augment the service from the downtown district to the station. The idea of installing this character of service is one of a number of good suggestions in developing new business on the depot lines, made in a paper by W. McK. White, presented before the Illinois Electric Railway Association and appearing in the issue of the ELECTRIC RAILWAY JOURNAL of July 31, 1920, page 225.

New Publications

Women Street Car Conductors and Ticket Agents

Bulletin of the Woman's Bureau No. 11, United States Department of Labor, 1921. 90 pages.

This bulletin describes an investigation made in June, July and September, 1919, and in January, 1920, by representatives of the Labor Department. The hours, wages and conditions of work of women conductors in Detroit and Kansas City and of ticket agents on the street railways in Boston and Chicago were studied. The investigation was made after the dismissal on a large scale of women conductors and women ticket agents in New York City following changes in the statute relating to the employment of women.

The report explains that the service of conductors is quite different from that of ticket agents, and this should be understood because legislation may be drafted to regulate hours for both groups together, without special consideration of the very different demands of the two occupations. In conductor service, the report points out, the conditions were more arduous on the roads examined than would otherwise have been the case because the women were the more recent employees and the best runs were chosen by the men who had seniority. Nevertheless, the report finds there is "no particular reason to prove that the work of street car conductor is unfit for women." On the contrary it seemed to combine many advantages not always found in the traditional occupations for women.

Forty-six women conductors in Detroit told the investigators that they preferred the work to any other they had ever done before. Only one woman, who used to drive a rural free delivery wagon, liked her previous occupation better. The difficulties with which both the companies and the women were faced in complying with the law in Detroit and Kansas City emphasize, however, in the opinion of the investigators, "the need for a very careful study of local conditions before any phase of a transportation law is decided upon, with a view to determining possible local adjustments to make compliance more feasible and less likely to wreck disaster upon those it was framed to benefit."

On the question of ticket agents the records from Boston and Chicago "show that with the eight-hour day and six-day week, without night work and with a wage far superior to that paid women in any other occupation, the woman ticket agent and collector is an accepted and permanent fact in two large cities." The report is an elaborate one and contains many interesting tables.

Personal Mention

Cincinnati's New Director

Mr. Kuertz's Appointment as Street Railway Director a Complete Surprise

William J. Kuertz, assistant city solicitor of the city of Cincinnati, Ohio, has been appointed director of street railways to succeed William C. Culkins, who retires on May 1 to become executive secretary of the Chamber of Commerce.

The choice of Mr. Kuertz came as a surprise to him as well as financiers, business men and city officials. Three hours after he had accepted the position he was in conference with Mr. Culkins, pertaining to street railway affairs. Mr. Kuertz accepted the position after a brief talk with Mayor John Galvin.

W. J. KUERTZ

Mr. Kuertz has been assistant city solicitor for the past three years. He began the practice of law in 1904. He is a self-made lawyer, never having attended any law school, but educated himself while employed as an office boy and later as a stenographer connected with the law firm of Ellis, Kincaid & Rogers.

In selecting Mr. Kuertz, Mayor Galvin said he was sure that he had picked a man who was capable of filling the position. The mayor said his name had not been mentioned to him by any of the business factions about town who came forward with candidates for the position, but Saul Zielonka, city solicitor, and he had discussed Mr. Kuertz for the position. Mr. Kuertz, who is associated with Mr. Zielonka, has been engaged with him in every legal action brought by the city against the Cincinnati Traction Company. He is thoroughly conversant with every one of the many legal questions which are now pending in that connection.

A conference has been arranged between Messrs. Kuertz and Culkins for the latter part of this week, so that Mr. Kuertz can thoroughly familiarize himself with all the angles of the situation.

Vacancies on Indiana Commission Filled

Governor McCray of Indiana on March 23 made his first announcement concerning appointments to important state positions, naming three members of the Public Service Commission. George M. Barnard, Republican, Newcastle, was appointed to succeed Paul P. Haynes, whose resignation was anonunced in these columns several weeks ago. John McCardle, Republican, Indianapolis, was reappointed, and State Senator Maurice Douglas, Democrat, of Flatrock, was appointed to succeed Fred Bates Johnson, Indianapolis. The appointment of Mr. Barnard is for the unexpired term of Mr. Haynes from April 1 to May 1, 1924. The reappointment of Mr. McCardle is for a four-year term from May 1, and Senator Douglas will serve four years from May 1.

The appointments were regarded as the most important which were before the Governor.

Mr. Barnard is an ex-Mayor of Newcastle. He is at present corporation attorney for the city. He has appeared before the commission several times as a representative of the public in municipal cases and is highly regarded at the statehouse. Mr. Haynes, who resigned recently, became engaged in special practice of the law in Indianapolis on April 1.

Mr. McCardle is vice-chairman of the commission. He was first appointed by ex-Governor Goodrich four years ago. He has served on the commission during the important war and readjustment periods when many complex problems were presented to the commissioners for solution.

State Senator Douglas represented Shelby and Bartholomew counties in the recent General Assembly. He was elected State Senator in 1916. He served several times as a member of the House prior to his election as Senator. Mr. Douglas is secretary of the Indiana Federation of Farmers' Associations. Mr. Johnson, who is to be succeeded by Senator Douglas, let it be known some time ago that he was not an applicant for the appointment. He is expected to resume the practice of law in Indianapolis.

There are five members of the commission. E. I. Lewis, Republican, Indianapolis, is chairman. Glen Van Auken, Democrat, is the other member of the commission.

Long Service Rewarded

J. W. Harris, for Thirty-six Years Manager of California Cable Road, Becomes President

James W. Harris, of the California Street Cable Railroad Company, San Francisco, Cal., recently was elected president and general manager and chairman of the board of directors. Mr. Harris began work with the company April 1, 1879, in a construction gang, and has served continuously since.

His first work with the company was as a carpenter in the construction of an extension of the line from Filmore Street to Presidio Avenue. When the work on this line was finished Mr. Harris was transferred to the car shops and in three years he had been promoted successively to foreman and master mechanic.

In 1891 Mr. Harris was given charge of the extension of the line along Hyde-Jones and O'Farrell Streets and from Kearny Street to the ferry.

Following the death of James B. Stetson, president of the road, in 1909, Mr. Harris was made vice-president and general manager, and was given a place on the directorate. At that time J. Henry Meyer was elected president. At a directors' meeting following the death of Mr. Meyer a few weeks ago Mr. Harris was elected to his place, meanwhile retaining his post as general manager.

J. W. HARRIS

John T. McGhee, who had been assistant superintendent, was made superintendent, and Harry N. Stetson, son of the former president, was elected to the board of directors.

With a record of thirty-six years as superintendent and general manager of the California Street line Mr. Harris is one of the oldest American street railway executives in point of service.

Charles F. Arendt, for many years employed by the Trenton & Mercer County Traction Corporation, Trenton, N. J., has been promoted to the position of chief inspector. He succeeds Harry West, who has been made night foreman at the company's carhouse in South Trenton.

Governor's Appointments Show Wide Choice

Political Affiliations Ignored in Selection of Members for New York's Transit Commission—State-Wide Commission All New

George McAneny, formerly president of the Borough of Manhattan and president of the Board of Aldermen, was named as chairman of the Transit Commission, a body created with the broadest authority the state can bestow on an administrative agency under its police powers, and with a mandate to clear up the muddled transit situation in New York City. The other appointments to the Transit Commission are Le Roy T. Harkness of Brooklyn and Major General John F. O'Ryan of New York. William A. Prendergast of Brooklyn will be chairman of the State-wide Public Service Commission. His associates will be William R. Pooley of Buffalo, Charles Van Voorhis of Rochester, Oliver C. Semple of New York, and Charles G. Blakeslee of Binghamton. All these appointments, which were sent by Governor Miller to the Senate on April 16, have been confirmed.

MR. McANENY has long been active in public life. Among his accomplishments during his municipal service was his long fight in the Board of Estimate for the adoption of the dual subway system.

Among other positions of public service Mr. McAneny has been president of the Board of Aldermen and president of the Borough of Manhattan. He started his career as a newspaper man, going back to it as associate business manager of the New York *Times*, in 1915, a post he relinquished only recently.

Mr. McAneny was born in Greenville, N. J., on Christmas eve, 1869. He was educated in the public and high schools of Jersey City, later studying law, although he never practiced at the bar. He served on the committee which framed the municipal home rule amendments to the State Constitution adopted in 1894.

Le Roy T. Harkness, former legal adviser to the New York Public Service Commission, is credited with signal service in safeguarding the city's interest in the drafting of the dual subway contracts. He has had a wide experience in New York traction affairs because of his long service with the commission.

Recently, with the co-operation of Charles E. Hughes and Oliver C. Semple, Mr. Harkness undertook a study of the traction situation in New York at the request of the Merchants Association. Mr. Harkness paid particular attention in his report to the underlying securities of the city's transit lines and their relation to the actual value of the properties. The report is in the hands of the Merchants' Association, which has already made known its willingness to offer it to the new commission.

John F. O'Ryan, although a lawyer by profession, has long been a soldier. He enlisted as a private in the National Guard in 1897, and after a succession of promotions became a major general intrusted with the command of the Twenty-seventh Division during the war. General O'Ryan is one of the few civilians holding a diploma from the War College, and was the only militia officer to command a division in the A. E. F. He was born in New York in 1874.

Of the commissioners who will serve on the transit board Mr. McAneny and General O'Ryan are Democrats. The former is classed as an independent, while General O'Ryan has been favored by Tammany Hall for positions in the public service. Politically Mr. Harkness classes himself as an independent Republican. All the new members of the Public Service Commission are Republicans. The salaries of each commissioner will be $15,000 a year.

William A. Prendergast is an authority on municipal financing and accounting. Throughout his long political career, which brought him into the office of Comptroller of the City of New York for the first time in 1910, Mr. Prendergast has been active in discussions of the city's transportation problem. Recently he has attacked Hylan's "do-nothing" policy, asserting that the Mayor by his attitude had forfeited the right to interfere. He has been a strong advocate of Governor Miller's traction plan.

Mr. Prendergast was born in New York on May 23, 1867, and attended public schools in Manhattan and Brooklyn. He entered business at the age of fourteen.

Oliver C. Semple is a New York lawyer, who has had an extensive experience in traction affairs. He aided in the drafting of the original Public Service Commission law and was himself counsel to the commission between 1907 and 1918. He was largely responsible for the drafting of the revision of that law and of the revision of the rapid transit act of 1920. He also assisted in drawing up the Interborough and the Brooklyn Rapid Transit contracts in 1913. Mr. Semple has been a consistent supporter of Governor Miller's traction plan, declaring that home rule was not involved in the situation and that "'public interest' means something more than the interest of one city or its people."

Charles G. Blakeslee of Binghamton is a Republican power in Broome county. He is a lawyer by profession, but an engineer as well. He has been corporation counsel of Binghamton, and has appeared at legislative hearings in opposition to the Governor's traction bill.

William R. Pooley was colonel of the old Seventy-fourth of Buffalo. He is a lawyer by profession.

Charles Van Voorhis is a lawyer of Rochester, of the firm of John Van Voorhis & Sons. During the war he served in the navy.

The Transit Commission is approaching a most complicated task. Questions of law, finance and the mechanical details of subway, elevated and surface operation must be considered in all their aspects before a single comprehensive plan at which the Governor aims can be evolved.

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LE ROY T. HARKNESS

Photo by Paul Thompson
GEORGE McANENY

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MAJOR-GEN. J. F. O'RYAN

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Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Cut of Ten per Cent on Steam Flow Meters

Considerable Interest Shown in This Product as Means of Checking Boiler Room Costs—Prompt Deliveries

One of the large manufacturers of steam flow meters has reduced prices 10 per cent effective April 19, but so far as can be learned other producers have not taken similar action. Considerable interest is being manifested in flow meters on the part of electric railways and power companies, it is reported, as a means of checking up boiler room costs and effecting economical operation. Demand, of course, under present adverse general market conditions, is not as large as has been the case, but at the same time a fairly good volume of business is being placed, several producers report. As a rule manufacturers do not stock this class of goods but at the same time deliveries are prompt and can be made in ten days or under.

Cement Prices Drop 60 Cents per Barrel

Demand Is on the Increase, but There Is Little Likelihood of a Shortage This Year

Consumers of cement are now able to buy this product at 60 cents per barrel cheaper than it cost the first of this month owing to a reduction in the price of bags in which cement is shipped. These formerly cost 25 cents each but manufacturers announced about the first of the month that on April 10 they would begin to ship cement in bags for which they now charge 10 cents each, thus accounting for the decrease noted above. The retail price of cement delivered at New York is now $3.50 per barrel. This compares with a peak price of $5.10 per barrel which was still in effect early last November.

Producers express satisfaction over the way the market is beginning to improve. Electric railways are doing very little buying for there is not much new track construction work under way this spring, apparently, but on the other hand the building industry is recently showing noticeable activity. Since February the curve of demand has climbed upward and at the present time shipments are said to be very little behind 1919 which was a fairly normal year.

Good stocks and immediate shipments prevail with producers in general, and despite some reports to the effect that a cement shortage will again prevail later this year there seems little likelihood of that. The maximum annual productive capacity of the country is estimated at 147,000,000 barrels, and last year, which was considerably above the average in demand, only about 96,000,000 barrels were shipped. The limiting factors in the cement supply for 1920 were railroad tieups, labor and coal shortages, and all these conditions are now very favorable for a large production if necessary.

Railways Not Turning to Used Equipment Market

Plentiful Supply of Material Awaits Anticipated Increase in Buying, but Present Demand Is Light

In view of depleted finances which, with many electric railways, has been the main factor in curtailing buying of new equipment to low levels, it might be thought that traction companies are turning to the second-hand market at this time as a source of supply. This is a logical conclusion, dealers in that field state, and ordinarily would hold true, especially in view of high prices of new material. At the present time, however, representative companies dealing almost exclusively with used electric railway products report that the market is extremely quiet. The chief factors inducing this inactivity are the declining state of the market, lack of finances and the need for labor readjustments on the part of railways.

There is a strong potential demand for good second-hand cars, trucks, motors and control equipment, electric locomotives and also for power plant equipment. With the large needs of electric railways in this respect in view, dealers are optimistic that with improving business conditions they will find a strong demand later in the year. Acting on this basis at least one of the leading factors in the market is going right ahead and stocking material but others are buying little or nothing to carry in stock. Those who are pursuing the latter course may be induced to do so by the fact that nearly all classes of material are in plentiful supply and can be picked up as needed, and furthermore, dealers' stocks are fairly well filled as it is.

A feature of the current demand is that most interest, it is stated, is being shown in double-truck rather than single-truck equipment to be used for one-man operation. Prices may still be said to represent peak quotations on second-hand material, for decided reductions have not been made, but on the other hand it must be remembered that dealers in used equipment advanced prices but sparingly the past few years.

Start of New Coal Year Finds Production Drastically Cut

Market Is Quiet with No Increase in Demand from British Strike—Prices Firming Slightly

With the ending of the coal year 1920-1921 on March 31, now three weeks past, little actual improvement is seen in the slump which the bituminous coal market is undergoing. Expectations of an increased demand resulting from the British coal strike have not been realized, and with the passing of the danger of a general strike in Great Britain there seems little likelihood of any increased buying from that source. The strike has now been in effect three weeks, and though many inquiries for coal from abroad have been received actual orders are lacking, for European markets are overstocked, too.

Though the present coal market is extremely quiet and consumers are apparently indefinitely postponing placing contracts signs are not wanting of a slightly firmer tone to the market. Production has declined steadily since last November and is now ranging around the unprecedentedly low figure of 6,000,000 net tons per week, according to the Geological Survey. Except for the extraordinary period of the coal strike in November 1919, this rate of production is lower than at any previous time since early in 1914.

PRICES AT PRESENT ARE LOW

Forced sales of steam coal are now fewer and prices, as reflected by the weekly index of *Coal Age*, are not only making a determined stand against further reductions but are also even firming slightly. As a matter of fact present prices are equivalent to those of two years ago, though labor costs have risen some 40 per cent since then. Furthermore, with reduced man power and an increasing number of coal cars in bad repair on steam roads, prospects of a car shortage on a return of anywhere near normal demand for coal are increasing. Taken all in all, indications point to a decided jump in soft coal prices next autumn.

The flat-footed refusal of union miners to consider any reduction in their scale of wages, together with the feeling that freight rates should be lower, are two factors that are important in delaying the return of buying confidence in the coal market. With a large part of the miners idle, however, and with the current volume of business of steam railroads as evidence of the crying need of rate readjustments both of these conditions bid fair to be remedied.

Tie Producers See Better Times Ahead

Increased Demand Generally Expected—Stocks Decreasing and Production Curtailed to Minimum—Prices Soft

Producers of wood ties see several factors in the present market which lead them to expect an increased demand later this year. The payment of money to steam roads under the Winslow Bill should result in additional ties being bought, it is stated. Labor prices are coming down and with the influx of immigrants under way once more the expensive labor factor in track construction should be greatly minimized. Furthermore, there has been a general buying strike due to expectations of lower prices, for one thing, and as prices have now receded a considerable amount it seems likely that the latter half of the year will show more activity than the first.

Production, it may be safely said, is confined almost entirely to actual orders, and meanwhile stocks are decreasing rather than increasing. As a matter of fact present tie stocks, especially of southern yellow pine, while adequate to make very prompt shipments, are not extra large.

There is a good deal of shopping done on the part of buyers and quotations consequently are soft. While labor costs at southern tie camps have been reduced as much as 50 per cent in some instances, it is reported, and water freight rates have also come down slightly, there seems to be a chance of still lower prices prevailing on behalf of both these factors. A representative producer reports that yellow-pine ties are about 20 cents apiece lower now than on Dec. 1. An idea of the market can be gained from the price paid by a large steam road recently for some yellow-pine ties, which was $1.85 each delivered f.o.b. car for the heart-center ties and $1.35 for the sap tie.

Several of the large steam roads have contracts for ties now in effect at the high prices prevailing early last fall. Some of these contracts still have a few months yet to run and are undoubtedly a factor in holding up the market. One road for instance has been forced to pay $1.85 for white oak ties, 8½ ft. long, 7 in. x 9 in., while the market at present is about 50 cents lower than that.

Lower Prices of Armature and Field Coils

Since the first of the year armature and field coils have dropped about 25 per cent, a large producer reports. This company's latest reduction was a cut of 10 per cent effective April 15. Another manufacturer dropped prices about 5 to 10 per cent on March 25.

Good stocks are being carried by producers and consequently deliveries are exceedingly prompt. The famine conditions of supply that prevailed last year have long since entirely disappeared. One factor in maintaining the good supply has been the mild winter just past which delt kindly with railway motors in the matter of burnouts.

Inactive Market for Car Curtains

With Prompt Deliveries and Considerably Lower Prices, Roads Are Not Repairing Summer Curtain Equipment

Producers of car curtains are one in reporting that electric railways are not repairing summer car equipment so far as curtains are concerned. For all the buying that is being done in this market at present the cars might well be run without curtains and in fact, it is stated, there is some tendency shown at present to buy new cars without curtain equipment in order to cut down expenditures. Not only are the electric lines inactive buyers but business in the steam road field is also absolutely dead, too. There is some hope expressed that sales will increase the latter part of the year, but on the other hand, some producers say they will be satisfied to make expenses this year. The one thing that would most aid a return of business, it is thought, is lower labor costs on railways.

In view of existing market conditions producers have very much curtailed their output, production in one representative case, for instance, being at only 25 per cent of capacity. Stocks of raw material now carried are ample, even somewhat larger than present conditions warrant, and deliveries are prompt, only ten days or less being required to finish an order.

The cost of cotton has of course taken a tremendous slump since the peak price of last summer, spot cotton which was worth over 40 cents a pound at that time now being quoted at about 12 cents, New York. Wages have receded slightly too, cuts of about ten per cent having been put into effect in the plants of some curtain manufacturers. Consequently prices of the finished product are considerably lower than the top price of 1920, just how much the reduction has averaged not being available, though one manufacturer reports 35 per cent.

Steel Corporation Drops Price on Sheets

The United States Steel Corporation has lowered its prices on sheets $7 to $14. This brings an even market again with corporation and independent mills on the same level. Black sheets, Pittsburgh, are 4 cents, blue annealed are 3.10 cents and galvanized are 5 cents. So far there has been no disposition to shade these prices and even with the former reductions there was little appreciable increase in demand. But with this lowered price it remains to be seen what the mills will do if the demand does not soon pick up. Sheet mill operations are running only at about a 30-per cent rate.

Iron Conduit Lower by from 5 to 10 per Cent

In line with general reductions in steel prices within the past few months—and more particularly in view of the recent drop in prices of the United States Steel Corporation on merchant pipe and other products—general reductions on conduit have been made by manufacturers. The decrease ranges from about 5 per cent to slightly more than 10 per cent on different sizes and became effective on April 14, 15 and 18 with various producers.

The general increase in discounts that was made is the same in several instances and amounts to two points on ½-in. conduit, three points on ¾-in. and 5 points on 1-in. and larger sizes, both black and galvanized. The discount on elbows and couplings is increased by three points. Incidentally, prices of the United State Steel Corporation on standard steel pipe, the raw material of conduit, have been decreased in the same proportion as the above.

Rolling Stock

Princeton (West Va.) Power Company, recently purchased two of the emergency Hog Island cars and three others released by the Bangor (Me.) Railway & Electric Company.

The Detroit (Mich.) Municipal Railway, has not yet placed contracts for the 100 Peter Witt cars mentioned in the March 19 issue and new bids will probably be called for. The company has, however, ordered twenty-five additional safety cars from the Osgood-Bradley Car Company, Worcester, Mass., at a cost of $6,695 each f.o.b. Detroit. Deliveries are to start within sixty days at the rate of two cars a day.

The New Bedford & Onset Street Railway Company, New Bedford, Mass., is converting its double-truck, closed passenger cars for one-man operation. Three cars are practically completed and these are expected to be placed in operation on the company's Middleboro division about May 15. Ten cars in all will be converted. They are Wason forty-seat cars. The summer line between Onset and Onset Junction will be operated by these, but on the line running into the city of New Bedford, two men will be used, the conductor boarding and leaving the car at the city fare limits.

Franchises

Linnton, Ore.—J. B. Schaefer, S. P. Parr and Louis Osberg have obtained a franchise from the County Commissioners to operate an electric railway along St. Helens road between Linnton and Twelfth and Burnside Streets. The franchise, approved as to form by Deputy District Attorney Pierce, is to continue in force until Aug. 20, 1940. A 10-cent fare is provided.

Track and Roadway

San Francisco (Cal.) Municipal Railway.—City Engineer O'Shaughnessy of the city of San Francisco, Cal., has been instructed by the Supervisors to prepare estimates of cost for extending the San Francisco Municipal Railway to the Ocean View District.

Evanston (Ill.) Railway.—This company will lay about 250 ton of new rail, replacing present track, this summer. Work is now in progress to replace all of the overhead copper. These replacements will bring the physical condition of the Evanston property up to a high standard.

Androscoggin & Kennebec Railway, Lewiston, Me. — The Androscoggin & Kennebec Railway has placed orders for one G. E. automatic substation control and one Westinghouse 500-kw. rotary converter with transformer and switchboard.

Tulsa (Okla.) Street Railway.—According to the city attorney the Corporation Commission will instruct the Tulsa Street Railway to double-track the Kendall and Main Street lines, and to spend about $388,000 within the next year in extensions and improvements.

Brantford (Ont.) Municipal Railway.—City Council has passed by-laws providing for the issue of debentures for the sum of $80,000 for extension, improvements and addition to the Brantford Municipal Railway, and for the issue of debentures for an additional sum of $40,000 for the construction of the St. Paul's Avenue subway.

Ohio Electric Railway, Springfield, Ohio.—The work of eliminating the grade crossing at Mount Street on the Norfolk & Western tracks will be delayed because of the inability of the Ohio Electric Railway to perform its share in the work. The Ohio Electric Railway is in the hands of a receiver.

Blue Ridge Traction Company, Danielsville, Pa.—The Blue Ridge Traction Company expects to build an extension during this year of three miles from Walnutport to Palmerton. Bids are now open for the construction work.

Montreal (Que.) Tramway.— Construction of direct tramway line to Model City is contemplated by Montreal Tramways.

Dallas (Tex.) Railway.—The Dallas Railway has begun work on the Seventh Street extension of the Tyler Avenue line in Oak Clix, one of the extensions to which the company was committeed under the terms of the franchise granted the Strickland interests in 1917. Work on this line had been postponed and additional time granted by the city on several occasions, due to the unsettled conditions and the inability of the traction company to purchase material. The line will be single track, and will cost approximately $100,000, according to estimates of the engineers of the traction company.

Mesaba Railway, Virginia, Minn.—The Mesaba Railway expects to install eight road crossing signals shortly.

Newell Bridge & Railway Company, Newell, W. Va.—The Newell Bridge & Railway Company expects within the next two months to refloor its bridge over the Ohio River. White oak ties 6 in. x 8 ft. x 8 in. will be used and white oak planking, largely 3-in. stock.

Power Houses, Shops and Buildings

Cincinnati (Ohio) Traction Company.—Preparatory to purchasing power from the Union Gas & Electric Company, the Cincinnati Traction Company has asked the city street railway director, to approve an expenditure of $380,000 to equip seven transformer stations in different parts of the city. Three of the stations will work automatically. The contract for purchase of the power goes into effect in September.

Professional Note

Lawrence P. Crecelius and Victor B. Phillips announce their association in the firm of Crecelius & Phillips, consulting, constructing and operating engineers with offices at 1302 Hanna Building, Cleveland, Ohio.

Trade Notes

Consolidated Steel Corporation announces the removal of its offices on April 16 to the Cunard Bldg., 25 Broadway, New York City.

The Superheater Company announces that after May 1, 1921, its general offices will be moved from 30 Church St., to 17 East Forty-second St., New York City.

The Corliss Carbon Company, Bradford, Pa., manufacturer of Corliss carbon brushes, has increased its capital stock from $500,000 to $1,000,000.

The Automatic Reclosing Circuit Breaker Company, Columbus, Ohio, announces the opening of an office at 401 National Bank of Commerce Bldg., St. Louis Mo., with C. P. Lohr as manager.

Victor T. Goggin, has severed his connection with Fred T. Ley & Company, Inc., as New England sales manager, to associate himself as contracting engineer with Dwight P. Robinson & Company, Inc., New York.

Bemis Car Truck Company, Springfield, Mass., has completed arrangements with James H. Denton, whose office after May 1 will be in the Marbridge Bldg., 1328 Broadway, N. Y. City, whereby the latter will represent the company in the territory comprised of New York, Pennsylvania, New Jersey, Delaware, District of Columbia, Virginia and Maryland. Mr. Denton in addition will continue as agent of the companies he has previously represented.

The Haskell & Barker Car Company, Michigan City, Ind., in its annual financial statement recently issued shows gross profits of $3,789,390 for the year ended Jan. 31, 1921. Expenses for repairs, renewals and maintenance amounted to $511,070, $300,000 was allowed for depreciation, and estimated federal taxes were $700,000, leaving a balance of $2,278,319. Quarterly dividends paid during the year totaled $880,000 so that the sum of $1,398,319 remained to be added to surplus. The report states that the non-payment of money owed the railroads by the government was effective in bringing to a halt the buying movement of railroads. Recent remedial legislation is expected to bring relief in that respect.

International Combustion Engineering Corporation Holdings.—What has been characterized as one of the biggest accomplishments in the development of stoker business and combustion business generally thus far is the organization of the International Combustion Engineering Corporation to control the Combustion Engineering Corporation of New York and the Underfeed Stoker Company, Ltd., of London, England. It owns almost all the stock of both these companies and of course controls also their subsidiary companies and representatives. The Underfeed company occupies in England a position similar to that of the Combustion company in this country, and the former company has agencies and representatives throughout the world.

New Advertising Literature

Solder.—The Union Smelting & Refining Company, Inc., St. Charles Street, Newark, N. J., is putting out a new handy-package "Usarco" solder in stick form for electrical use.

Catalog.—American Jobbers Supply Company, Woolworth Building, New York City, has recently issued bulletin No. 7 covering its line of crossarms, line hardware, glass insulators, wood pins and brackets.

Evaporators.—"Lillie Evaporators for Waste Waters and Solutions Generally" is the title of bulletin 11 distributed by the Wheeler Condenser & Engineering Company, Carteret, N. J., describing the Lillie evaporator.

Pumping Equipment. — The Goulds Manufacturing Company, Seneca Falls, N. Y., has issued a catalog describing the Goulds "Autowater" system, electrically-driven pumps, etc. The company is also circulating a small booklet giving instructions for the installation, operation and care of Goulds "Hi-Speed" pumps.

Screw Thread Standards.—The Bureau of Standards, Department of Commerce, Washington, D. C., is distributing miscellaneous publication No. 42, entitled "Progress Report of the National Screw-Thread Commission." The report contains standards for screw threads ascertained and established by the commission.

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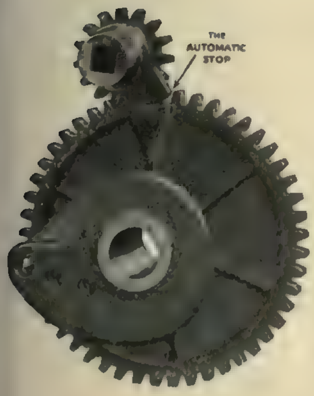

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Has Removed the Splints and Bandages from Rails in City Service

Over nine years have elapsed since the Thermit Insert Process of Rail Welding was introduced to take the place of rail jointing.

Up to that time electric railway paved track could be nothing better than a series of splints and bandages at intervals of 30 to 60 ft., for what else was the electro-mechanical connection of splice plates, bolts, nuts, rivets and bonds?

Little success has attended later efforts to obliterate the joint by means of other welding methods which only partially solve the problem, as in most cases they simply weld fish plates or splice bars to the rails.

These systems have many objections, the principal one being that the heads of the rails are not continuous and the elastic curve in the top fibres of the head cannot be transferred across the gap between the rail ends, with the result that the joint eventually cups.

Thermit Insert Welding was the first, and it still is, the only method of producing a continuous rail by means of liquid steel produced by the reaction of iron oxide and aluminum. This superheated liquid steel, produced at the extremely hot temperature of 5000° Fahr., surrounds the rail ends to be welded. The sudden expansion of the rail ends caused by the heating action forces them together with tremendous pressure, thus effecting a pure butt-weld on both sides of a white-hot insert placed between the rail ends.

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THE lighting and power supply of Amusement Parks is an important use for Park Cables.

The above picture shows the process of installing Habirshaw Park Cable in the municipal park system of St. Louis. Over 225,000 feet of Habirshaw cable have recently been installed or are to be placed within a few weeks.

That the reliability of Habirshaw Park Cable is looked upon with the greatest confidence is evidenced by the fact that a project of such importance and involving such a large expenditure of money is being carried out with Habirshaw cable.

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Babson's report of April 12th says:

"Business will be called 'quiet,' but in many lines there should be some improvement. If you have weathered the storm of the past seven months, you can take courage! At this state of depression the main problem is selling. Cut down your production expenses as far as you can, do without further expansion in new buildings and equipment, but don't skimp on your selling appropriations. Now is the time to use that reserve fund which was set aside during the fat years! Later in the depression area we shall come to the point where you should increase your plant, but this summer—increase your advertising! Take the aggressive course. There will be considerable business; the firm which goes after it will be the one to get it!"

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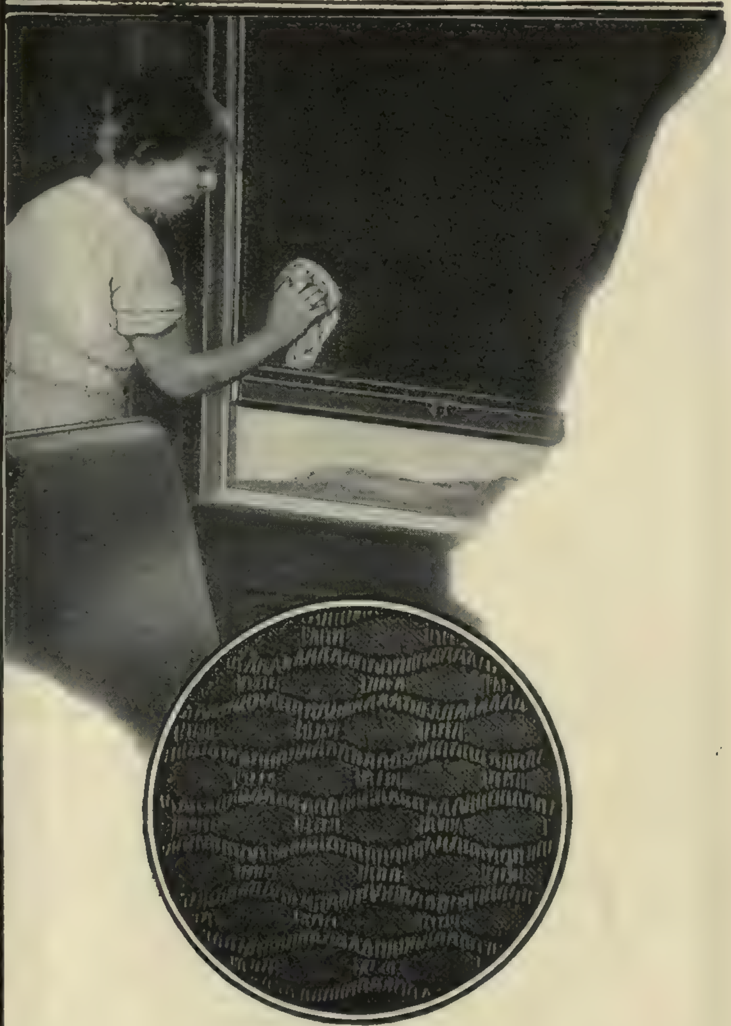

Fabrikoid in many beautiful leather grains is also used extensively for railroad upholstery.

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REDESIGNED, RECLASSIFIED, PATENTED

During the last fifteen years numerous changes have been made in the Stirling Boiler. In some instances these have been to meet special and unusual operating conditions, and others have been the result of improvements in details of design and construction. These changes have been carefully watched and proven under various and difficult conditions of operation. The advantages of many of them in service have been so marked that after years of experience and study these features have been incorporated in the redesigned Stirling Boiler.

The studies which have led to redesign have also led to a consideration of the variation between classes and sizes of Stirling Boilers. This has resulted in a reclassification of these boilers in which the variation between classes and sizes is simple, logical and progressive.

The redesigned and reclassified Stirling Boiler is now offered.

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No matter what his caste, no matter what his occupation, no matter how black his heart or red his hands, the Hindu who dies within a radius of *pachas* (fifty) miles of Benares is supposed to be spared all future torment.

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In order to lubricate successfully there are four things a turbine oil must not do—

(1) It must not decompose.
(2) It must not emulsify.
(3) It must not evaporate excessively
(4) It must not cause corrosion.

Turbines lubricated with Texaco Turbine Oils are not subject to these undesirable defects for the following reasons:

a. Texaco Turbine Oils do not decompose over long periods of use. They are pure mineral oils and great care has been taken to keep them free from any materials which might oxidize or might precipitate tarry sludge when exposed to heat and pressure.

b. Texaco Turbine Oils do not form emulsions. They are so highly refined that there are no unsaturated hydrocarbons left in them which will hold water in suspension. They free themselves readily from any water or moisture which may enter the system.

c. Texaco Turbine Oils are so carefully refined in the process of manufacture that they contain a minimum of light ends, and have a minimum evaporation under high operating conditions.

d. They will not cause corrosion of shafts and bearings as the chemically active ingredients which appear in ordinary oils are removed or completely neutralized.

The turbine using Texaco Oil is assured of a constant stream of clean, cooling oil by virtue of entire freedom from clogged oil pipes.

Texaco Turbine Oils are readily and rapidly filtered.

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The following Texaco Turbine Oils are recommended:

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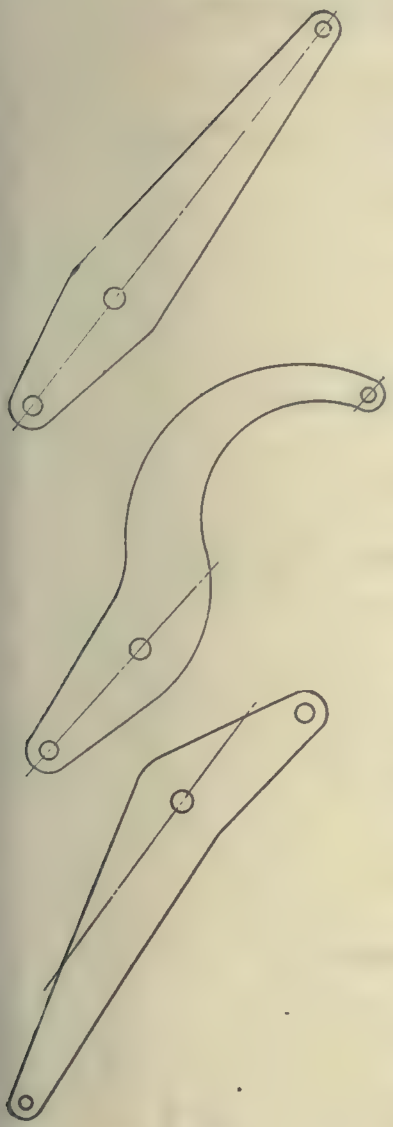

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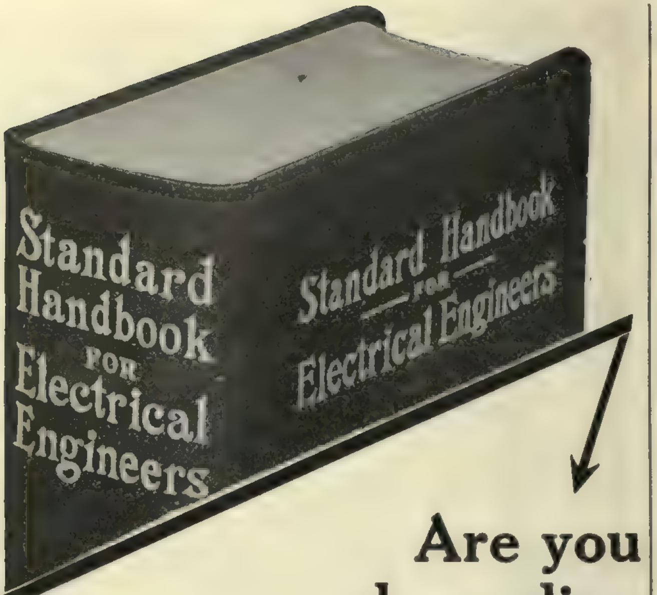
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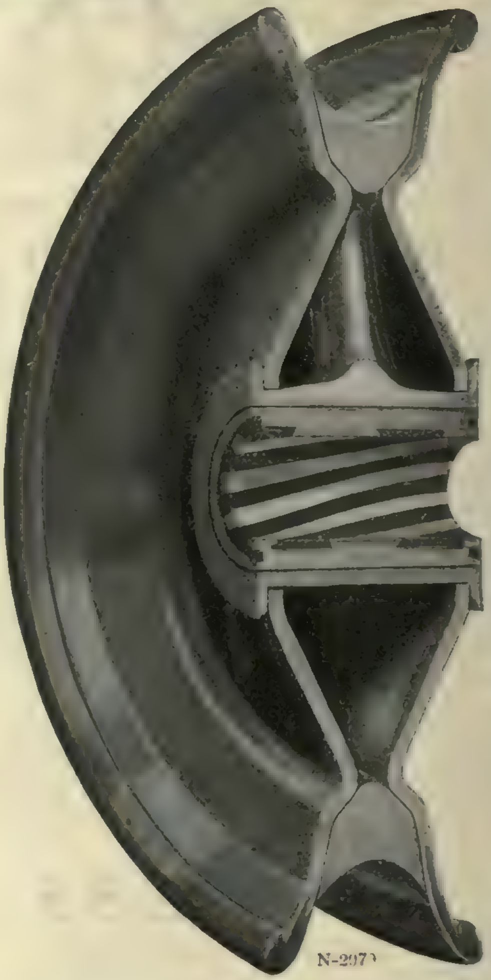

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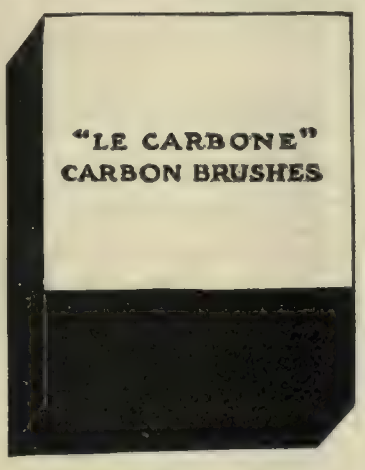

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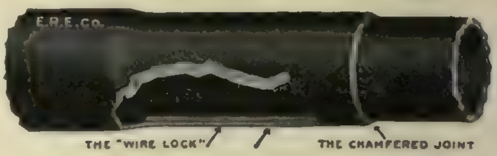

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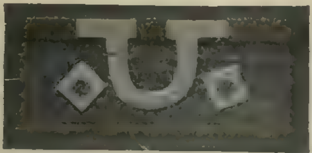

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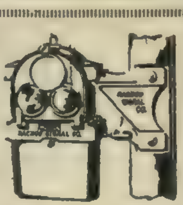
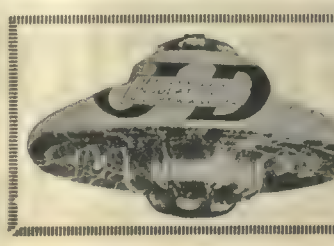
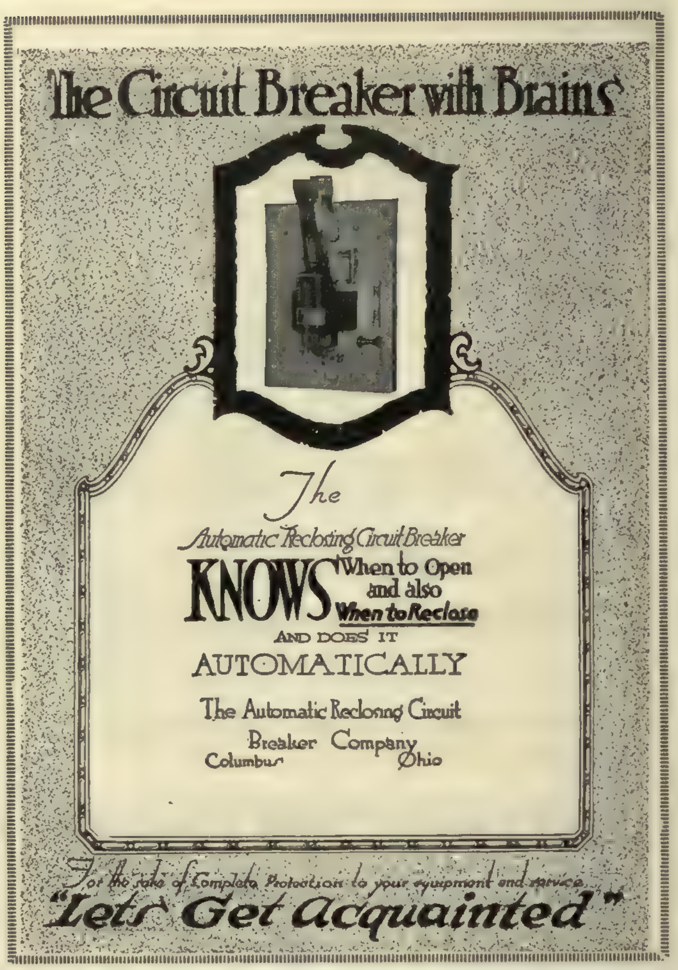




Better High Tension Insulators

Advice, Estimates and Engineering Service on request

Jeffery-Dewitt Insulator Co.
Huntington, West Virginia



The Circuit Breaker with Brains

The Automatic Reclosing Circuit Breaker KNOWS When to Open and also When to Reclose AND DOES IT AUTOMATICALLY

The Automatic Reclosing Circuit Breaker Company
Columbus Ohio

For the sake of Complete Protection to your equipment and service

"Let's Get Acquainted"

SPECIALISTS
in the
Design and Manufacture
of
Standard--Insulated—and Compromise Rail Joints.

The Rail Joint Company
61 Broadway, New York City

BARBOUR-STOCKWELL CO.
205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of
Special Work for Street Railways
Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

WE-FU-GO AND SCAIFE
WATER PURIFICATION SYSTEMS SOFTENING & FILTRATION FOR BOILER FEED AND ALL INDUSTRIAL USES
WM. B. SCAIFE & SONS CO. PITTSBURGH, PA.

Nelsonville Filler and Stretcher Brick for T Rails

Makes permanent, light, level pavement with a minimum of paving repairs.

The Nelsonville Brick Co.
Columbus, Ohio

RAMAPO

Automatic Safety and Automatic Return Switch Stands for Passing Sidings. Tee Rail Special Work for Interurban Lines and Private Rights of Way. **Manganese Construction a Specialty.**

Ramapo Iron Works
HILLBURN, NEW YORK
Plants at Hillburn, N.Y. and Niagara Falls, N.Y. New York Office, 30 Church Street

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THE CUTTER ELECTRICAL AND MANUFACTURING CO. CIRCUIT I-T-E BREAKERS PHILADELPHIA

I. T. E.
Circuit Breakers
for heavy street railway work are the best obtainable. Write for New Complete Catalogue.

SPECIFY
THE TERRY TURBINE
For Driving Your Auxiliaries
TERRY STEAM TURBINE CO.
Hartford, Conn

BAKELITE-DILECTO
The fields of usefulness for Bakelite-Dilecto are many and varied because of its superior merit over materials heretofore available in sheets, tubes or rods. The exceptional qualities of Bakelite-Dilecto are satisfying electric railways all over the country. Investigate.

The Continental Fibre Co., Newark, Delaware
Branch Offices:
CHICAGO, 332 S. Michigan Ave. NEW YORK, 233 Broadway
Pittsburgh Office, 301 Fifth Ave. San Francisco Office, 525 Market St.
Los Angeles Office, 411 S. Main St.
Canadian Office, 1710 Royal Bank Bldg.,
Cor. King and Yonge Sts.
Toronto, Ont.,

FOSTER SUPERHEATERS

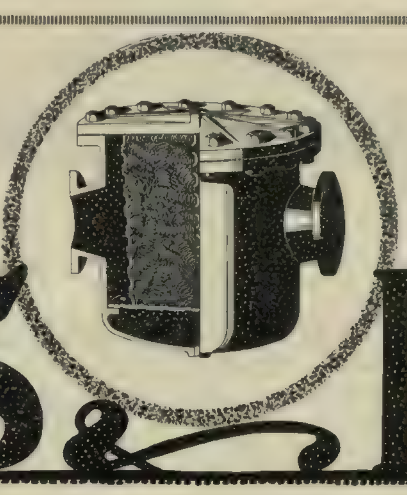
A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits

Power Specialty Company Boston Chicago Philadelphia San Francisco Pittsburgh London, Eng. **111 Broadway, New York**

Cotton Covered

AN IMPORTANT feature in the manufacture of our cotton covered magnet wire is the proper selection of the cotton stock. Every bit of yarn is thoroughly tested in our laboratories to make certain that our rigid specifications for uniform first quality, long-fibre Sea Island cotton are met. This care in selection applies as well to the copper conductor—round, square or rectangular. Only the best grade, conforming to Mathiessen's standard, is used. These specifications, and the corresponding inspections, follow the wire during the course of manufacture until it is shipped, layered exactly on each spool, and well protected against rough handling during transportation.

Belden Manufacturing Company
Twenty-Third Street and Western Avenue
Chicago
Eastern Office and Warehouse: Metuchen, N. J.



Adhesion Oilseparator.

Large Surface Exposed To Steam,
Highest Efficiency For Separating Oil From Steam,
Excess Area Eliminating Backpressure.

SCHUTTE & KOERTING Company
1155 Thompson · Str · Philadelphia, Pa.

NILES-BEMENT-POND CO.
111 BROADWAY, NEW YORK

MACHINE TOOLS

FOR ELECTRIC RAILWAYS

- Axle Lathes
- Wheel Presses
- Car Wheel Lathes
- Boring Mills
- Lathes
- Hammers
- Cranes
- General Machine Tools

J. H. WILLIAMS & CO.
"THE WRENCH PEOPLE"
Brooklyn · Buffalo · Chicago

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

DAHLSTROM
Metal Mouldings & Shapes

Light cold drawn shapes for electric cars not only add strength and durability to the car, but they reduce upkeep and repair costs as well.

Dahlstrom cold drawn shapes are accurately drawn and made to meet requirements. Shipped in mill lengths or cut to order, punched, reamed and finished or shipped in the rough as desired.

Our catalog illustrating our various stock shapes will be gladly sent upon request.

DAHLSTROM METALLIC DOOR COMPANY
431 Buffalo Street, Jamestown, New York

New York, 130 E. 15th St., 2 Rector St.
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Detroit 855 Book Bldg.
St. Louis 106 N. 3rd St.
Chicago 19 S. LaSalle St
Branches in all principal cities.

Waterproofed Trolley Cord

Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER SILVER LAKE

If you are not familiar with the quality you will be surprised at its ENDURANCE and ECONOMY

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY

Manufacturers of bell, signal and other cords.

Newtonville, Massachusetts

Registers International

International Fare Registers. Single registers, round and square; double registers, duplex counters, car fittings. Exclusive selling agents for HEEREN ENAMEL CAP AND COAT BADGES.

The International Register Co.
15 South Throop Street, Chicago

Type R5

Reduce Commutator Wear and Losses Due to "Tie-Ups"

To be absolutely safeguarded against excessive commutator wear—assured of real mileage day in and day out—and to obtain lower operating costs, use

Columbia Pyramid Brushes

the brushes that were made to suit the commutator and the service.

You name the job—we'll name the brush

National Carbon Company, Inc.
Cleveland, Ohio

The purpose of a fare box is to insure the safe delivery to your counting room of every fare collected on your cars.

Cleveland Fare Boxes take your fares direct from Car Rider to Counting Room.

The Cleveland Fare Box Company
CLEVELAND, OHIO

The Canadian Cleveland Fare Box Co, Ltd.
Preston, Ontario

Use them in your terminals—
PEREY TURNSTILES or PASSIMETERS

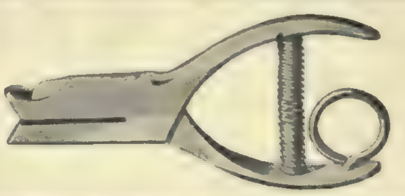
Faster than the ticket seller

Perey Manufacturing Co., Inc.
30 Church Street, New York City

FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK CO.
Second and Diamond Sts., Philadelphia



Economical in the Long Run

BONNEY-VEHSLAGE TOOL CO.
Newark, N. J.

Electric car heaters—thermostatic control—pneumatic car door operators—buzzers, single-stroke bells, starting signal lights—special resistances.

CONSOLIDATED CAR HEATING CO.
ALBANY, NEW YORK, CHICAGO

Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost.

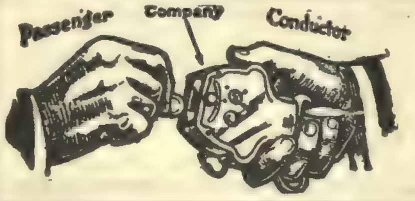
The Cooper Heater Company
Carlisle, Pa.

Bound Brook Trolley Wheel Bushings Give Longer and Better Service

THERE are more Bound Brook (Oil-less) Trolley Wheel Bushings in use today than all other makes combined. That is because Bound Brook Bushings, by virtue of their construction, invariably outlast all other types.

All Genuine Graphited Oil-less Bushings have always been made at Bound Brook, U. S. A.

BOUND BROOK OIL-LESS BEARING COMPANY
Bound Brook, New Jersey *Detroit Office: 1723 Ford Bldg.*



Direct Automatic Registration By the Passenger

Rooke Automatic Register Co.
Providence, R. I.

PROVIDENCE FENDERS
H-B LIFE GUARDS

The Consolidated Car Fender Co, Providence, R. I.
Wendell & MacDuffie Co., 61 Broadway, New York
General Sales Agents

ELECTRIC RAILWAY JOURNAL

Think "SEARCHLIGHT" First

ADVERTISING RATES

POSITIONS VACANT—Business Opportunities and other undisplayed ads, 8 cents a word, minimum $2.00 an insertion.

POSITIONS WANTED—Evening work wanted, tutoring and other undisplayed ads of individuals looking for employment, 4 cents a word, minimum 75 cents, payable in advance.

ADD 5 WORDS for box number in undisplayed ads if replies are to any of our offices. There is no extra charge for forwarding replies.

DISCOUNT OF 10% if one payment is made in advance for 4 consecutive insertions of undisplayed ad.

ADS IN DISPLAY TYPE—Space is sold by the inch (30 in. to a page), the price depending upon total space used within a year, some space to be used each issue.

RATE PER INCH for ads in display space:

1 to 3 in., $4.50 an in.	15 to 29 in., $3.90 an in.
4 to 7 in., $4.30 an in.	30 to 49 in., $3.80 an in.
8 to 14 in., $4.10 an in.	50 to 99 in., $3.70 an in.

POSITIONS VACANT

EMPLOYMENT

POSITIONS WANTED

POSITIONS VACANT

CAR-BARN foreman wanted for property located in Central West. Eighty cars, one-half Birney type. Must be competent to supervise maintenance standard and safety car equipment. P-872, Elec. Ry. Journal, Old Colony Bldg., Chicago.

TIMETABLE maker, able, ambitious, experienced; state qualifications, experience and salary expected. Chicago Surface Lines, 604 Borland Bldg., Chicago.

POSITIONS WANTED

AMUSEMENT park manager at liberty will operate park for owners on salary and commission basis, or will lease park outright upon terms mutually satisfactory. Many years' experience. electric railway references. Address, Park Manager, Room 403, 1511 Arch Street, Philadelphia, Pa.

EXPERIENCED outside construction man desires position in way of electric railway, lighting, underground and submarine cables. Most experience in city of 200,000 population. Can produce results. PW-828, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

FREIGHT manager: Young man with proven exeuctive ability, 11 years of sound business experience and thoroughly familiar with trolley freight problems. Will consider a change of position. Now employed as chief clerk of freight service in large Eastern street railway corporation. PW-876, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

MANAGER or superintendent. Age 37, height 5 ft. 8 in.; seventeen years' experience in all branches of tramway work with one up-to-date corporation, as conductor, motorman, inspector, and motor inspector. As motor inspector I was responsible for the motormen and their efficiency, power economy, rolling stock, etc. In two years I reduced the power bill by £4,000 ($20,000) per year; increased the wheel tire mileage 15,000 miles; brake blocks 12,000 miles; reduced accidents and insurance premium; power consumption for B. T. H. four motored cars, was the lowest in the British Isles; almost the lowest any make of tramcar. Competent to take charge of maintenance; overhead and permanent way departments; office routine as correspondence, costing, filing, legal procedures, returns and analysis. Conversant with the revenue side and alert to stop "leakages"; I have organized working and bonus systems approved of by the highest authorities on tramways and trade unionism. Capable of dealing with labor troubles. My present post in the tropics gives me experience with a colored public and labor. Further particulars, copies of references, and photograph if required. PW-871, Elec. Ry. Journal.

SUPERINTENDENT of transportation, desires a change, will consider any city or suburban property that requires a man of broad experience in this line; age 40, clean, progressive, nearly 18 years' experience on large city and suburban properties, successful in dealing with public and labor, having a proven record as a transportation man who knows how to get results. Would prefer property that needs building up. Best of references. PW-867, Elec. Ry. Journal., Old Colony Bldg., Cleveland.

POSITIONS WANTED

LEGAL NOTICE

STATEMENT OF THE OWNERSHIP,
MANAGEMENT, CIRCULATION,
ETC., REQUIRED BY THE
ACT OF CONGRESS OF
AUGUST 24, 1912

Of Electric Railway Journal, published weekly at New York, N. Y., for April 1, 1921.

State of New York }
County of New York } ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared James H. McGraw, Jr., who having been duly sworn according to law, deposes and says that he is the Secretary of the McGraw-Hill Co., Inc., Publishers of Electric Railway Journal, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, McGraw-Hill Co., Inc., 10th Ave. at 36th St., New York, N. Y. Editor, Henry W. Blake and Harold V. Bozell, 10th Ave. at 36th St., New York, N. Y. Managing Editor, Henry W. Norris, 10th Ave. at 36th St., New York. N. Y. Business Manager, L. W. Seeligsberg, 10th Ave. at 36th St., New York, N. Y.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) McGraw-Hill Co., Inc., 10th Ave. at 36th St., New York, N. Y.; James H. McGraw, 10th Ave. at 36th St., New York, N. Y.; Arthur J. Baldwin, 10th Ave. at 36th St., New York, N. Y.; John McGhie, 10th Ave. at 36th St., New York, N. Y.; Fred Low, 10th Ave. at 36th St., New York, N. Y.; Henry Blake, 10th Ave. at 36th St., New York, N. Y.; Leonard Baldwin, 27 Pine St., New York, N. Y.; F. S. Weatherby, 163 Clinton Road, Brookline, Mass.; Arthur J. Baldwin, Trustee for Estate of John A. Hill, 10th Ave. at 36th St., New York, N. Y.; Arthur J. Baldwin, Trustee for Donald Baldwin, 10th Ave. at 36th St., New York, N. Y.; Arthur J. Baldwin, Trustee for Franklin Baldwin, Grace Baldwin and Cynthia Haselton, 10th Ave. at 36th St., New York, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) NONE.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is * * * (This information is required from daily publications only.)

JAMES H. McGRAW, Jr., Secy.

Sworn to and subscribed before me this 30th *day of March,* 1921.

[SEAL] MARTIN J. WIEMER.

Notary Public, Kings County Certificate No. 92. Certificate filed in New York County No. 202.

My Commission expires March 30, 1922.

LEGAL NOTICE

USED CARS

For Every Service

Railway Motors

Standardize Your Equipments at Minimum Cost

TRANSIT EQUIPMENT CO.
501 Fifth Avenue, New York

Wanted:—Wheel Press

Second hand, first class condition, hydraulic 100 to 125 tons, for 36 in. wheels on standard or less track gauge. Address

GREAT LAKES COAL MINING CO.
Columbus, Ohio

New—Used—Rebuilt

MACHINERY AND SUPPLIES
for construction and industrial work.

READING ENGINEERING CO., INC.
154 Nassau St., New York

FOR SALE

SECOND HAND CROSSINGS

4 sets Steam and Electric Crossings.

60 lb. A.S.C.E. Rails, 90° Angles.

Single Track Steam over Double Track Electric.

3—9-ft. 6-in. Centers.

1—10-ft. Center.

CONDON & BOLEN
311 Karbach Block, Omaha, Nebr.

FOR SALE

EIGHT SINGLE-TRUCK

MOTOR CARS

Vestibuled, mounted on Lord Baltimore trucks, with new wheels, equipped with G. E. 1000 motors and K-10 controllers.

ALSO FOUR SMALL
TRAILER CARS

for operation with the above described motor cars. These cars have not been in operation since being thoroughly overhauled and are stored in the car house of the Buffalo & Depew Railway Co., at Depew, N. Y.

Proposals for the purchase of these cars to be sent to the United States Housing Corporation, Washington, D. C., on or before May 10, 1921.

FOR SALE

TRANSFORMERS

1—Type H, Form RP, Cycles 60, 200 KVA., 19100/33000Y—2300 Oil Cooled, Step Up Transformer.

1—220 Volt (B) KW., 60 Cycle, Oil Cooled, Step Up Transformer. 19100/33000Y — 2300.

4—Type HS, Form RT, Cycles 60, 135 KVA., 17100/19100/33000Y — 370/370/185, Oil Cooled Step Down Transformers.

All filled with oil and in excellent shape.

UNION TRACTION CO.
Nashville, Tennessee

---

700 tons new 9 in.

GIRDER RAIL

Penna. Steel Co. Section 228, 107 lb. to the yard. Attractive price upon application. Subject to R. W. Hunt & Company's Inspection. Prompt shipment.

H. M. FOSTER COMPANY
Continental Building, Baltimore, Md.

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here's a buy!

This steel body and its equipment was purchased for electric switching locomotive but was never assembled. Will sell the entire equipment listed blow for $9,500.00, F.O.B. Tacoma, Washington, or singly as follows:

1—Steel Body, Complete	$3500.00
1—4 Motor G. N. 55 Equipment with Type M Control, Complete, (Except Gears)	6000.00
1—14 E.L. Double End Air Brake Equipment (Except 2-D 3 E G Compressors, 1-J8 Governor—2-20½ x 42 Reservoir	500.00
3—A E R A—Standard Type E. C. Axles with 6-37 in. Rolled Steel Wheels, 3½ in. Thread, ⅞ in. Flange	460.00
2—Extra 37 in. Wheels as above	100.00
3—60 Tooth Gears 6-15/16 in. bore, 5⅜ in. face, 2½ pitch, mounted on above axles	120.00
2—Gears as above	80.00
3—Extra 17 Tooth Pinions, 5-⅜ in. face, 2½ pitch	40.00
Total	$10,800.00

For further information write **G. O. SNIDER,** *Purchasing Agent,*
Tacoma Railway & Power Co., Tacoma, Washington

NEW
REBUILT

ELECTRIC MOTORS

REWINDING
REPAIRING

NEW A.C. MOTORS ¼ to 15 H.P.—LARGE STOCK USED MOTORS
EXCELLENT REPAIR SERVICE ON ANY SIZE OR TYPE

CLEVELAND ARMATURE WORKS, INC.
EST. 1895 **4732-4-6 ST. CLAIR AVE., CLEVELAND O.** ***INC. 1918***

RAILS RAILS RAILS

FOR SALE

500 tons 7 in. Tram-Head Rail; Bethlehem Steel Co. Section No. 238; in 30 ft. lengths. Joints to match.

Rails equal to new. Ready for instant shipment.

Karasik, Friedman & Co., Inc., Woolworth Bldg., New York

SOME ONE WANTS TO BUY

the equipment or machinery that you are not using.

This may be occupying valuable space, collecting dust, rust and hard knocks, in your shops and yards.

SELL IT BEFORE DEPRECIATION SCRAPS IT

THE SEARCHLIGHT SECTION
IS HELPING OTHERS

—LET IT HELP YOU ALSO

0128

WE'VE GOT 'EM!

No. 1 Relaying Rails and Angle Bars for Immediate Shipment

**30 lb., 40 lb., 50 lb., 56 lb., 60 lb.,
68 lb., 70 lb., 80 lb., 90 lb.**

WRITE OR WIRE FOR QUOTATIONS STATING TONNAGE and DESTINATION

***NEW*—80-LB. RAIL and ACCESSORIES** A. R. A. "TYPE B" RAIL

Approximately 30,000 gross tons—Standard Lengths—Stored at Kearney, N. J.

HYMAN-MICHAELS COMPANY

NEW and RELAYING RAILS

Peoples Gas Building, Chicago, Illinois

New York Office:
1324-1326 Woolworth Bldg.

Pittsburgh Office:
1312 First National Bank Bldg.

St. Louis Office:
2115 Railway Exchange Bldg.

We buy electric and steam railways that are to be dismantled

For 20 Years

we have been
Buying and Selling

Second-Hand Cars

Trucks and Motors

At Your Service

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

Machinery in Stock *for* *Immediate Shipment*

ROTARY CONVERTERS

1—500 kw. Westg. 6 ph., 25 cy., 440 v., A.C.; 600 v. D.C., 500 r.p.m.
1—500 kw. G. E. 600 v. D.C., 3 ph. 60 cy.
2—200 kw. G. E. 25 cy. 370 v. A.C., 600 v. D.C., 750 r.p.m.
1—150 kw. Westg. 3 ph. 60 cy. 370 v. A.C., 575 v. D.C., 720 r.p.m.
2—150 kw. G. E. 25 cy., 370 v. A.C.; 600 v. D.C., 750 r.p.m.

FREQUENCY CHANGER SETS

1—500 kw. G. E. 3 ph., 60 cy., 2300 v., 750 r.p.m. generator dir. ctd. to 700 hp., 3 ph., 25 cy., 13200 v., 750 r.p.m. motor.
1—500 kw. G. E. 3 ph. 60 cy. 2300 v. 300 r.p.m. generator dir. ctd. to 800 hp. 3 ph. 25 cy. 2300 v. 300 r.p.m. motor.

ARCHER & BALDWIN, Inc.
114-118 Liberty St., New York City
Tel.: 4337-8 Rector

If there is anything you want—

or something you don't want that *other* readers of this paper can supply—or use—advertise in the

Searchlight Section

NOW— is the time to offer good second-hand equipment or machinery for sale. The demand is great for good plant for immediate delivery. That's why you should advertise NOW.

NOW— or any other time, use the Searchlight Section for advertising

Agencies Wanted
Agents Wanted
Auction Notices
Buildings For Sale
Business Opportunities
Civil Service Opportunities
Contracts To Be Let
Contracts Wanted
Educational Courses
Employment Agencies
Exchanges
For Rent Items
Franchises
Industrial Sites
Miscellaneous Wants
New Industries Wanted
Partners Wanted
Patents For Sale
Patent Attorneys
Plants For Sale
Positions Vacant
Positions Wanted
Property For Sale
Receivers' Sales
Representatives Wanted
Salesmen Wanted
Work Wanted
Etc., Etc., Etc.

35

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Aftercoolers
Ingersoll-Rand Co.

Air Receivers
Ingersoll-Rand Co.

Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Angle Bars
Lackawanna Steel Co.

Automobiles and Buses
Brill Co., The J. G.

Axles
Bemis Car Truck Co.
St. Louis Car Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Standard Steel Works Co.
Westinghouse Elec. & Mfg. Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Babbitt Metal
More-Jones Brass & Metal Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

Batteries, Dry
National Carbon Co., Inc.

Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
St. Louis Car Co.
Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bearings, Oilless, Graphite, Bronze and Wood
Bound Brook Oil-less Bearing Co.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail
Niles-Bement-Pond Co.

Boilers
Babcock & Wilcox Co.

Boiler Tubes
National Tube Co.

Bond Testers
American Steel & Wire Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Ry. Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Ry. Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Book Publishers
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
National Ry. Appliance Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Traction Brake Co.

Brass & Bronze Products
Amer. Copper Products Corp.

Brooms, Track, Steel or Rattan
Zelnicker, W. A., Supply Co., Inc.

Brushes, Carbon
Corliss Carbon Co.
General Electric Co.
Jeandron, W. J.
Morganite Brush Co., Inc.
National Carbon Co., Inc.
United States Graphite Co.
Westinghouse Elec. & Mfg. Co.

Brush Holders
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Bemis Car Truck Co.
Brill Co., The J. G.

Bushings, Graphite and Wooden
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Cambric, Yellow and Black Varnished
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St. Louis Car Co.

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Wood Co., Chas. N.

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Comstock Mfg. Co.
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Columbia M. W. & M. I. Co.
Comstock Mfg. Co.
General Electric Co.
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Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

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Westinghouse Elec. & Mfg. Co.

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Russell Mfg. Co.
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Westinghouse Elec. & Mfg. Co.

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Samson Cordage Works
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Creosoting
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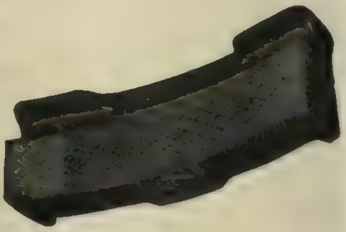

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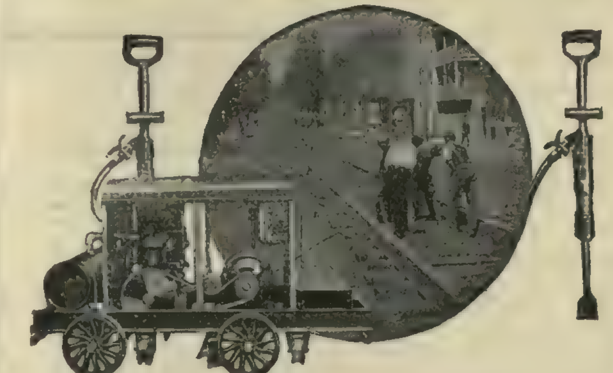

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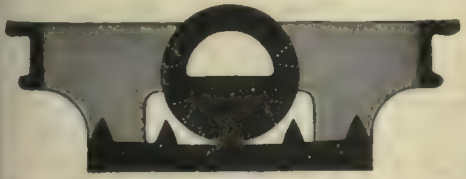

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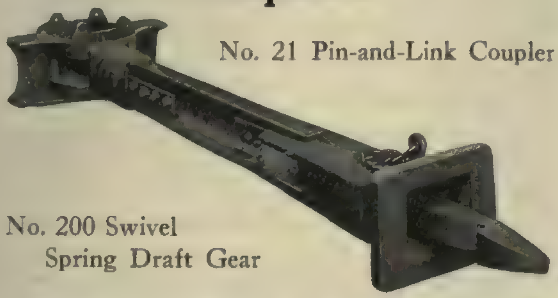

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No. 200 Swivel Spring Draft Gear

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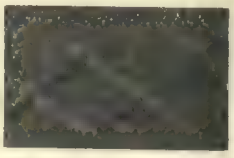
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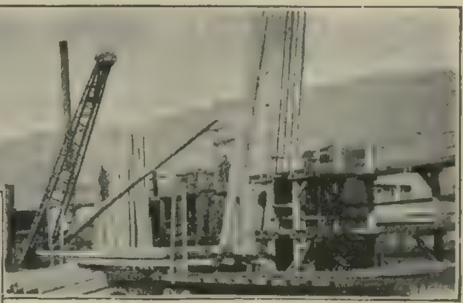
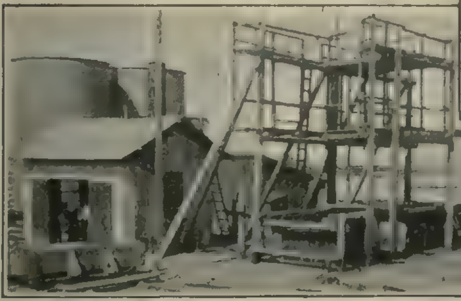
Five cars butt-treated Western Red Cedar poles after loading from treating tank. National Pole Company, Everett, Wash.



Plant of the Western Pole Preservers, Sandpoint, Idaho, where the ground line area of poles is punctured, or perforated before treatment.

One of the first commercial pole treating plants. Operated by the National Pole Company, at Libby, Montana, in 1913 (courtesy W. M. Leavitt, Spokane).



One of the Open Tank Process pole creosoting plants of Baxter & Jordan, Wilmington, California.

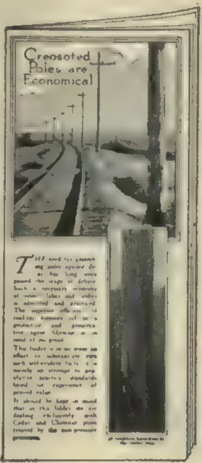
Puncturing Machine in operation (courtesy Western Red Cedar Association).

Progress in Pole Treatment—

FOR years it has been recognized that the value of treatments applied to cedar and chestnut poles is largely proportionate to the depth to which the preservative penetrates the sap wood. This, in turn, depends upon the efficiency of the method of treatment employed, and also upon the quality of the preservative used.

Formerly the treatments applied at commercial plants were crude, because proper equipment had not been developed. During the past seven years, however, great progress has been made in this direction, as is graphically shown by the photographs. The centre picture shows the early plant of the National Pole Company, the others their modern plant and the up-to-date equipment of other pole companies.

The chief obstacle to the effective treatment of cedar poles is the natural resistance of the wood to the injection of creosote. To overcome this difficulty, the Western Red Cedar Association has developed mechanical means of perforation or puncturing which, it is claimed, achieves a ½-inch penetration of the sap wood ring of the ground line area. The machinery employed is illustrated above. But with this, as with other methods of application, satisfactory results are very uncertain unless the preservative used is of proper grade and character.



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Butt-treated cedar and chestnut poles should serve 25 years and upwards. And they will give this long service *if* the best preservative is used—a preservative that combines the greatest decay-retarding qualities with the highest degree of physical fitness. Carbosota Liquid Creosote Oil is such a preservative. It is standardized, uniform, and insures success.

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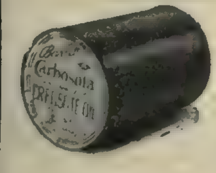
(Poles should be thoroughly seasoned, especially when surface treatments are to be applied, and the portions to be treated carefully cleaned of all adhering inner bark.)



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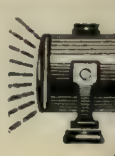

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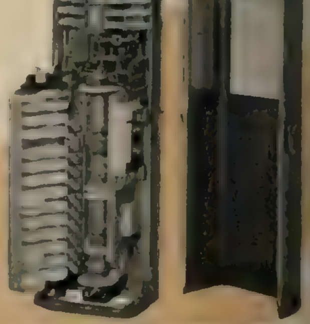

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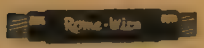

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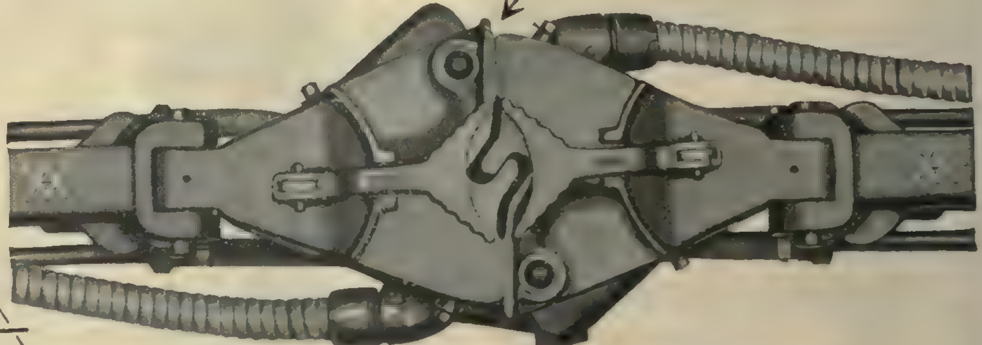
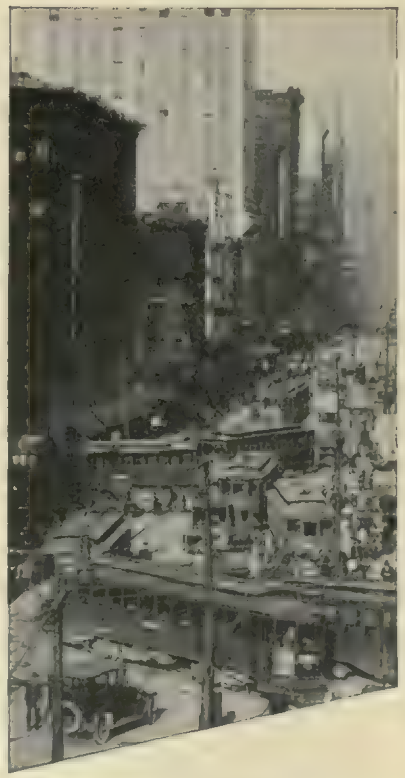
Tight-Lock!



Meaning

Car, Air and Electric Coupler

ABSOLUTE RIGIDITY AT THE POINT OF CONTACT



THE Westinghouse Type K-1-A "Tight Lock" Automatic Car, Air and Electric Coupler is a complete success because it is mechanically correct in construction.

It recognizes that merely to make the various connections is not enough; the connections must be maintained by insuring perfect contact at all points under the severest conditions of strain and stress.

This problem of maintaining perfect connections is solved by the famous "Tight Lock" feature; the greater the strain or tension, the tighter the lock; hence the one outstanding advantage that places Westinghouse couplers foremost in the esteem of traction operators — Absolute Rigidity at the Point of Contact.

The K-1-A is a safety device, a time-saver and an economy. We recommend it for all the lighter forms of multiple-unit operation on surface lines. It is also recommended without the electric portion for motor and trailer service, the advantage of this arrangement being that the electric feature may be added at any time if it is later found expedient to change over to the multiple-unit system.

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General Office and Works, Wilmerding, Pa.
"Fourteen Miles East of Pittsburgh"

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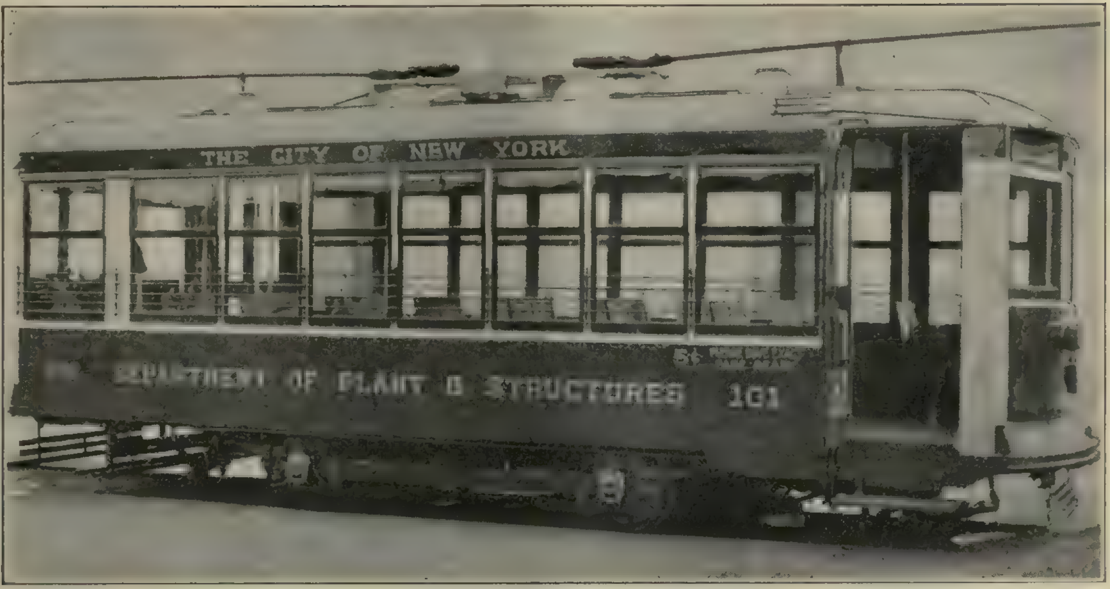


And now New York City. One of the twenty-eight safeties ordered for Richmond, a borough of New York City.

The Genuine Safety Car Is Chosen by the New York City Administration, Too!

The administration of the City of New York had promised the people of its smallest borough, Richmond, good service in restoring the Midland Railway.

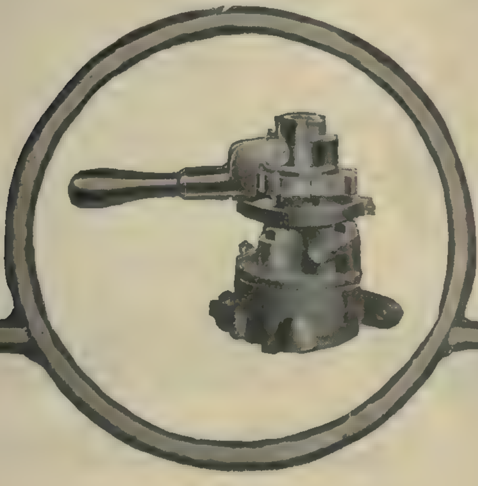
On Dec. 1, 1920, it began to make good that promise in the most effective way we know of—by the installation of twenty-eight standard Safety Cars which are in charge of the Department of Plants & Structures, the City of New York.

All credit to the Administration for following the worthy example set by the Brooklyn Rapid Transit Company which is operating several hundred genuine safeties on many lines of New York's biggest borough.

Big borough or small borough, village or metropolis, country or city, it's always the same story of success when the car used is a Safety Car, moreover,

It is a Safety Car Only

when equipped with automatic, laborless apparatus, so interlocked that regardless of the illness or distraction of the operator, the power will be cut off instantaneously, the air brakes and sander apply immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed and the step folded before the car can start, and when the airbrake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.



Safety Car Devices Company
Boatmen's Bank Bldg., St. Louis
Chicago San Francisco New York Washington Pittsburgh

Phono-Electric

11,000 Volt Contact Wire in the Hoosac Tunnel Zone

The Hoosac Tunnel, one of New England's most important traffic links, handling about 100 trains a day, has been fitted with **Phono-Electric Trolley Wire** ever since it and its approaches were electrified.

The wire in the tunnel is 15 feet above the rails while the approach wire is 22 feet above the rails.

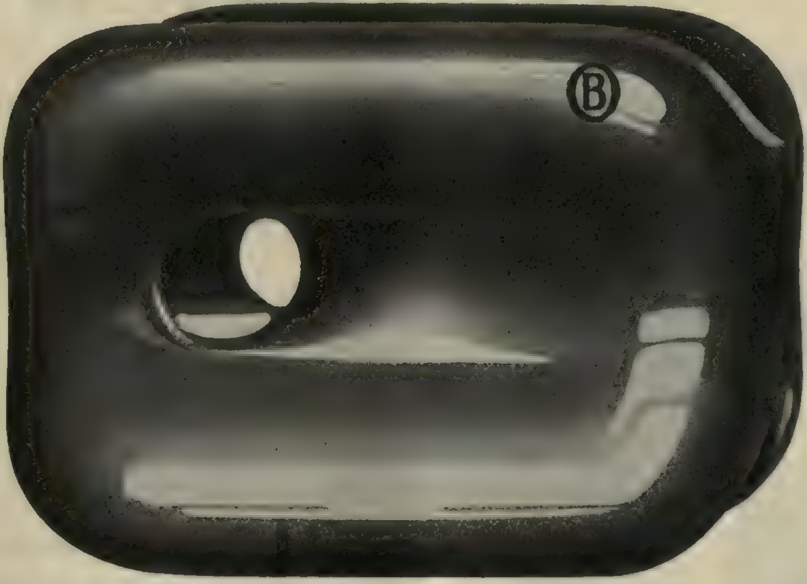
The same **Phono-Electric Contact Wire** for this 11,000 volt, 25 cycle service has been in use since May 27, 1911—7.92 miles of route and 21 miles of track.

Heavy service and sudden changes in clearance are no burden on **Phono-Electric Trolley Wire** because of its toughness in composition and trueness in gauge.

Bridgeport Brass Company
Bridgeport Connecticut

O-B XH Porcelain Strain Insulators

For Cross Spans and Guy Wires



O-B Type XH Strain Insulator
Round corners shed abuse.
Illustrated full size.

-B Suspension Insulators on 130,000 volt line. O-B XH Insulators, made in same plant, are reliable electrically.

O-B Wood Core Strain Insulators carry what is considered the longest span in the world—5010 feet—operating at 150,000 volts. O-B XH Insulators, made in the same plant, are strong mechanically.

Rugged Mechanically—High Puncture Value

High tension (wet ware) porcelain is the reason for the electrical and mechanical reliability of O-B XH Strain Insulator. It is made in the O-B Insulator factory side by side with the insulators which have made remarkable records on high voltage transmission systems.

O-B XH Strain Insulator has a long leakage path and a high puncture value. It is rugged—built for abusive handling. Strands thread through easily and interlock mechanically. Even should the insulator be broken, the strand cannot become separated.

See pages 88 *to* 95 *Catalog No.* 18

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Mansfield, Ohio

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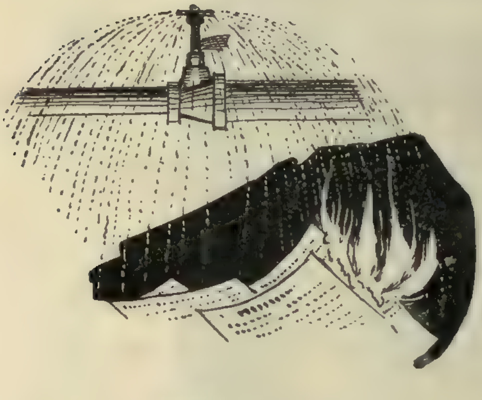
Paris, France

Member American Electric Railway Association 1921

Manufactures: Rail Bonds, Trolley Materials,
High Tension Porcelain Insulators,
Third Rail Insulators,
Car Equipment.

A Tiny Sprinkle Kills the First Flicker of Flame



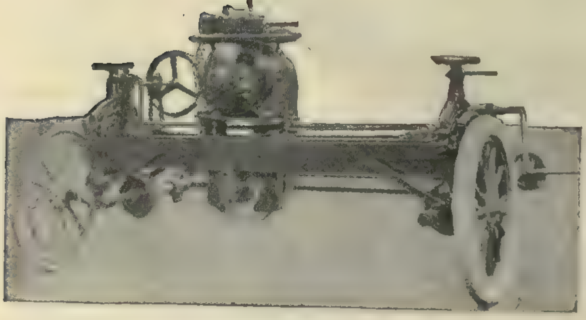
Allowed to burn, torrents may not stay the conflagration. So with trackwork.

An hour's grinding and the newly worn rail joint is leveled, the incipient corrugation is removed.

Allowed to wear, cupped joints, corrugations and battered crossings take their heavy toll.

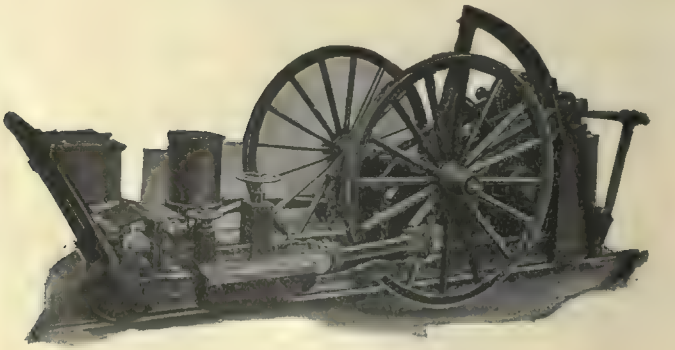
Progressively they rob. They rack the precious rolling stock, waste the costly power, dissipate the all-powerful public's sympathy.

Then comes extensive welding plus grinding or even track condemnation, and the three R's—replacement, repaving and ruination—happily avoidable for many years by rail grinding.



Universal Rotary Track Grinder

Atlas Rail Grinder



Reciprocating Track Grinder

ACT 1:

Investigate this expense-saving equipment.

Railway Track-Work Company
3132-48 East Thompson St.
Philadelphia

A Plan for Reducing Crossing Maintenance

As practised by Mr. H. M. Steward, Supt. of Maintenance, The Boston Elevated Railway Company. As reported in the March issue of "Electric Traction."

"ON all railroad main-line tracks solid manganese steel crossings, seven inches in depth, are used and are laid on INTERNATIONAL STEEL CROSSING FOUNDATIONS, which are laid on from 10 to 12 inches of broken stone tamped with pneumatic tool. A six-inch concrete paving base is installed and the crossings are paved with granite blocks and grout joints. Anti-rail creepers are installed for a considerable distance on the steam railroad tracks on either side of the crossings to prevent them getting out of line."

"It is found that if the above type of construction is installed properly the maintenance problem becomes of no moment. Only minor repairs are required during the life of the crossing frogs."

To assist you in a careful consideration of this method of economizing on crossing maintenance we prepare complete proposal plans showing INTERNATIONAL STEEL CROSSING FOUNDATIONS under your crossings.

WRITE TODAY!

Steel Crossing Foundations in C.C.C. & St. L. R.R. Main Line since Dec. 1914.

The International Steel Tie Company

16702 Waterloo Road, Cleveland, Ohio

***International Products*: Steel Twin Ties; Steel Crossing Foundations; and Steel Paving Guard;** are manufactured and sold in Canada by the Sarnia Bridge Company, Ltd., Sarnia, Ont.

Steel Twin Tie Track

TULC is sold on the basis of results

One way to buy lubricant is the "blind" way without any regard to results—the other is to give every consideration to "results."

The first way is the costly way. The second is the intelligent and economical method. By buying on the basis of results, you are assured of decreased labor charges, less wear on axles and armatures, saving in the cost of brasses and babbitts — decreased operating costs all along the line.

Progressive properties everywhere are learning to rely on Tulc as the solution of their lubricating problems, because Tulc is sold, not as so many pounds of lubricant at so many cents per pound, but as a direct means of decreasing lubricating costs.

Electric Railways using Tulc report actual savings as high as 40%, proof positive of the economy of buying *lubricating service,* rather than so many gallons of lubricant.

Write for complete data and a copy of our booklet "Results."

"Overall Specialists"

The service men who work with you on your lubricating problems are not "experts on theories." They put on overalls and get right down to brass tacks—pack your cars—show you how and why Tulc should be used. They get results—real money saving results—99 times out of a hundred. The hundredth time there is no charge for the service.

The Universal Lubricating Co.

Offices: Schofield Bldg. Works: Sweeney Ave.

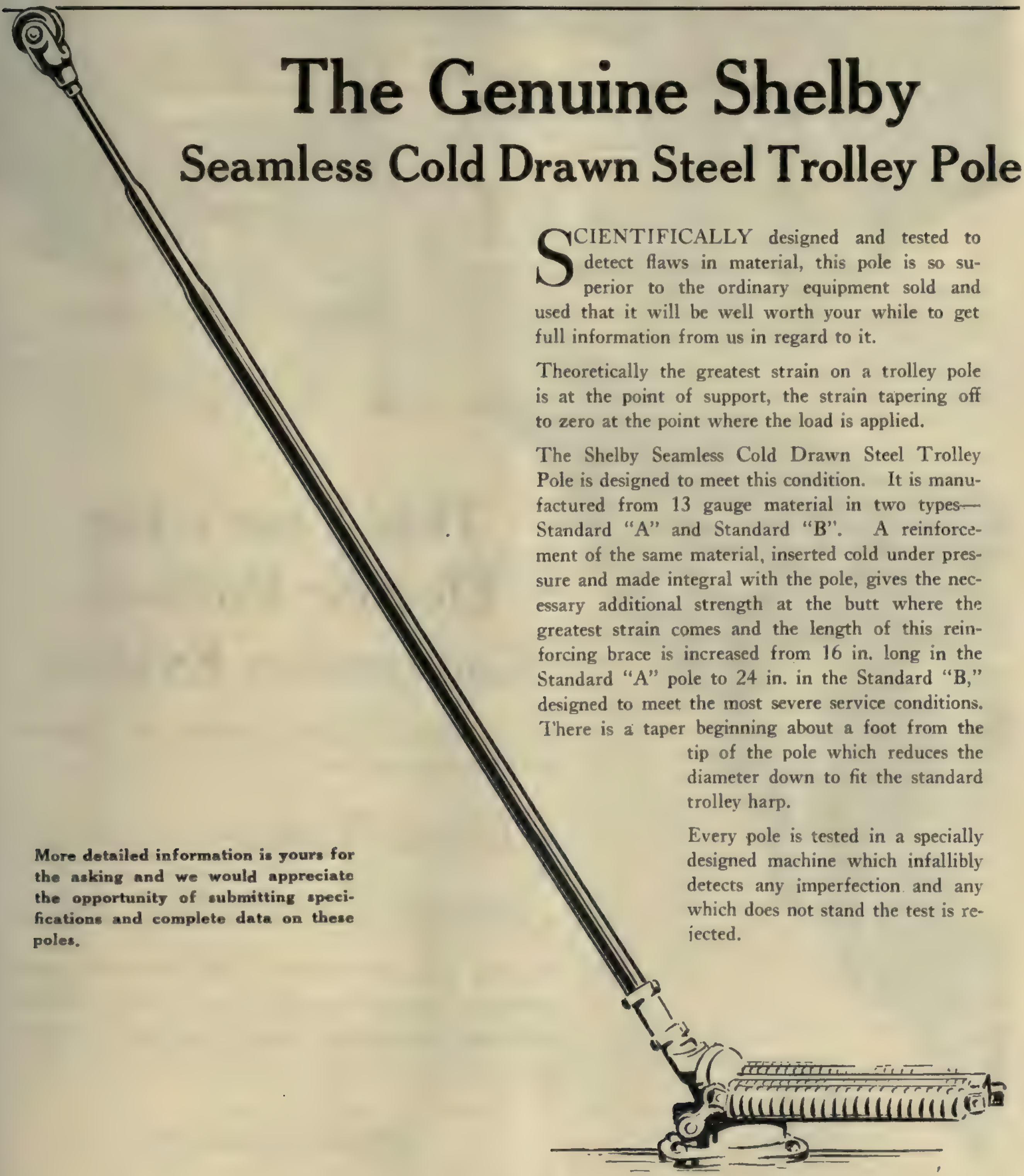
Cleveland, Ohio

TULC
A
LUBRICANT

—scientifically and accurately compounded to reduce lubricating costs

The Genuine Shelby

Seamless Cold Drawn Steel Trolley Pole



SCIENTIFICALLY designed and tested to detect flaws in material, this pole is so superior to the ordinary equipment sold and used that it will be well worth your while to get full information from us in regard to it.

Theoretically the greatest strain on a trolley pole is at the point of support, the strain tapering off to zero at the point where the load is applied.

The Shelby Seamless Cold Drawn Steel Trolley Pole is designed to meet this condition. It is manufactured from 13 gauge material in two types—Standard "A" and Standard "B". A reinforcement of the same material, inserted cold under pressure and made integral with the pole, gives the necessary additional strength at the butt where the greatest strain comes and the length of this reinforcing brace is increased from 16 in. long in the Standard "A" pole to 24 in. in the Standard "B," designed to meet the most severe service conditions. There is a taper beginning about a foot from the tip of the pole which reduces the diameter down to fit the standard trolley harp.

Every pole is tested in a specially designed machine which infallibly detects any imperfection and any which does not stand the test is rejected.

More detailed information is yours for the asking and we would appreciate the opportunity of submitting specifications and complete data on these poles.

ELECTRIC SERVICE SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

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1921

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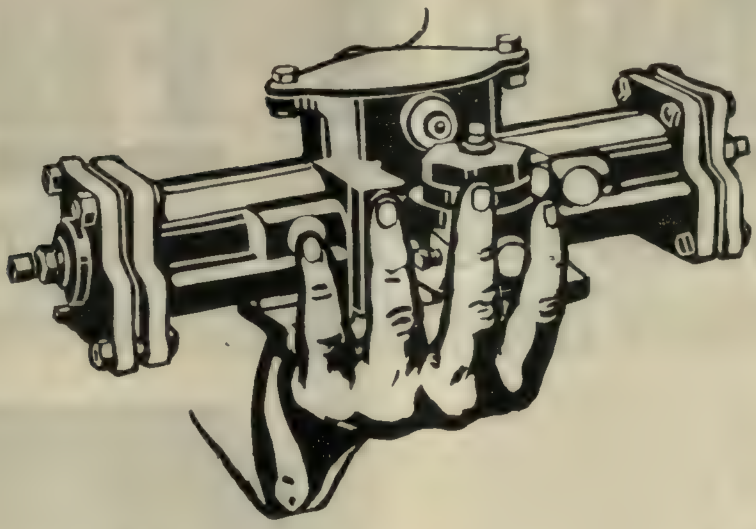
which will go to every important electric railway executive in the United States and Canada, and to practically every electric railway in the world.

Special Features

to be announced shortly will bring this exhibit home to electric railway men with exceptional force, be exceptionally useful to them, and create a lasting impression in favor of exhibitors. Reserve your exhibit space NOW.

To be issued in connection with The Annual Meeting of American Electric Railway Association



Pneumatize! *Modernize!*

"That yankin' is what destroys them doors"

"Pullin' 'em like that. That's the way y' get the rubber off."

That's exactly what the motorman said to his conductor one cold November morning as the latter rushed off the front end to snatch a can of hot coffee at a lunch wagon. He didn't like the violent way his mate pulled the door open.

We don't know whether the motorman said this because he was deeply interested in keeping down his employer's door upkeep expense or because he knew from previous winters how disagreeable it would be for him and his passengers to have a cold blast driving past a supposedly-closed door.

We do know, however, that because doors which are opened and closed with National Pneumatic Door and Step Control don't have to be slammed or yanked about, their runways, fixtures and pneumatic door buffers or cushions serve many thousands of miles with no maintenance attention whatsoever and go a long way to permit efficient, comfortable heating.

National Pneumatic Company

Originators and Manufacturers of

National Pneumatic Door and Step Control
National Pneumatic Motorman's Signal Lights
National Pneumatic Safety Interlocking Door Control
National Pneumatic Door and Step Operating Mechanism
National Pneumatic Multiple Unit Door Control

Make your peak periods produce maximum profit and efficiency

National Pneumatic Company, Inc.
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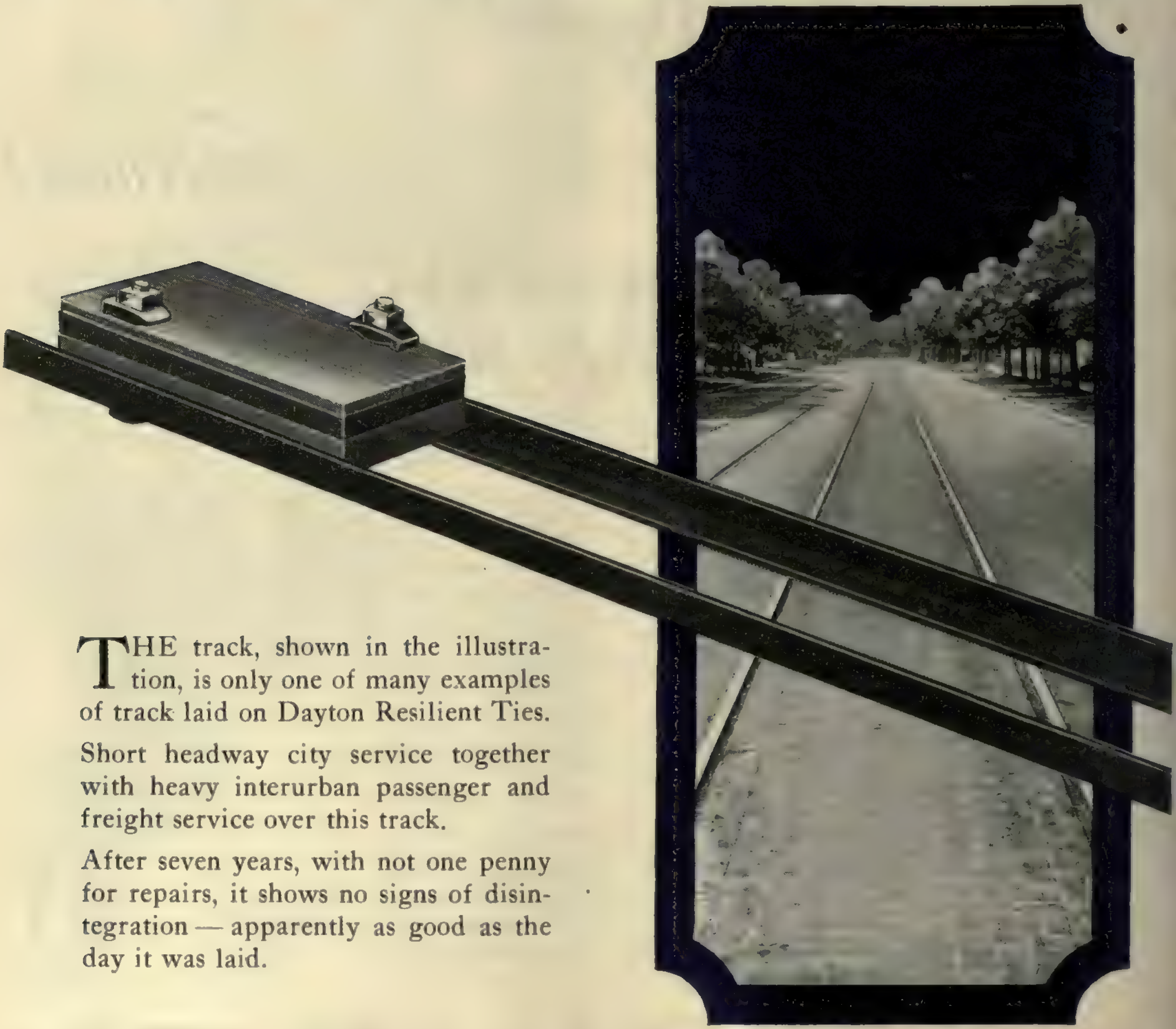
REDUCE FIRST

Save $6,000 Per Mile over Track Laid on Wood Ties in Concrete Foundation



THE track, shown in the illustration, is only one of many examples of track laid on Dayton Resilient Ties.

Short headway city service together with heavy interurban passenger and freight service over this track.

After seven years, with not one penny for repairs, it shows no signs of disintegration — apparently as good as the day it was laid.

DAYTON

COST of New Track

Save $2,000 Per Mile over Track Laid on Wood Ties in Gravel Ballast

IF you are going to lay new track you certainly want to do the job right and at the least possible first cost. You also want to secure a track that will not have to be relaid in a short time nor require constant repairing to the joints and to the street paving adjacent to the rails.

Here are five reasons why Dayton Resilient Ties will save you money both now and hereafter on all track work:

(1) Reduce First Cost $6,000 a mile saved over wood ties in concrete foundation or $2,000 a mile saved over wood ties in gravel ballast.

(2) Longer Life to Track Track laid on Dayton Resilient Ties will last longer than any other track construction known to date, because the resilient wood and asphalt construction of these ties preserves the track foundation from disintegration caused by vibrations and shocks. Therefore, Dayton Resilient Ties directly overcome the cause of all track failure.

(3) Reduce Track and Paving Repairs Paving along the track, especially at the joint, will not heave up or settle down, as the cause of this heaving and settling (the disintegration of the foundation) is removed.

The joint tie is so constructed that it affords a broad bearing surface for the rail. This gives additional strength and resiliency to the most vulnerable portion of the track, enabling it to withstand the blows and shocks to which it is subjected. The steel plate on the joint tie, in addition to acting as a reinforcement, serves as a welding base and eliminates the necessity of copper bonding.

(4) Reduce Upkeep of Rolling Stock Ordinary repairs for rolling stock run into large figures, but they increase 100% when cars must operate over bad track.

It has been demonstrated beyond dispute that there is only one way to avoid these conditions, and that is through the application of resiliency in your track construction.

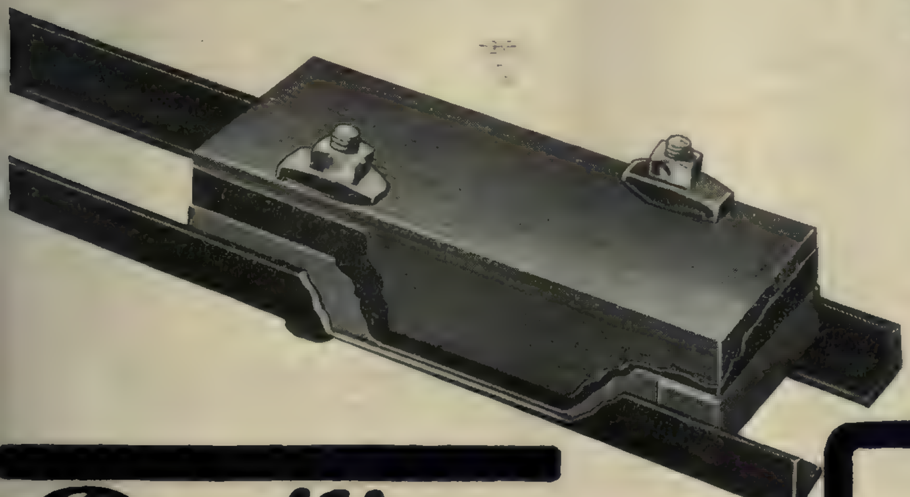
Think how carefully you guard the car body—trucks, motors, etc., by applying resiliency in their construction. Why not, then, give the same consideration to the base on which the whole structure rests?

(5) Reduce Traffic Noise Noise resulting from the moving cars is surprisingly reduced through the use of Dayton Resilient Ties. This alone is proof that the hammer blows and vibration are being absorbed and dissipated before they have a chance to do their deadly work on the foundation and rolling stock.

In the near future it will be practically impossible to obtain wooden ties. They are increasing in cost every day. Even now their cost is practically prohibitive. Therefore, if you can build a track with a tie that will reduce your first cost to considerably less than with wooden ties and give you better service, is there any reason why you should not use them?

You want to save money on that next track job—and you want to get a better track. Have the absolute facts about track construction laid before you. Just tear off the coupon in the corner and hand it to your stenographer. It will bring you complete literature on Dayton Resilient Ties and tell you about the experience of others in the saving through their use.

The Dayton Mechanical Tie Company
704 Commercial Building
Dayton, Ohio



Resilient TIE

PIN TO LETTER

Dayton Mechanical Tie Company
704 Commercial Bldg.
Dayton, Ohio

Without obligation please send me full information about your Dayton Resilient Tie.

What do you need to be convinced?

It's barely possible that there's a shadow of a doubt in your mind about Johnson Fare Boxes increasing gross revenue on your properties 3 to 10%.

Perhaps you're willing to concede that they have made that great an increase on some roads but think that conditions on your property are "different"—that they wouldn't do as well on your cars.

But we still insist that they *will*. We insist that records made on more than two hundred other electrical railways can be duplicated on *yours*.

And we want to *prove* it—if you'll only tell us what sort of evidence you need to be convinced.

Is it indorsement from other Electric Railway Executives? We have scores of letters that back up all our arguments. Is it statistics, records, or other forms of authentic data? Our files are full of just such facts and figures.

Why not write and give us permission to lay our case before you? There is no expense involved and you are obligated in no way. And it will bring you closer to that "additional 3 to 10%".

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Illinois

The World's best Lubricants

Going a Step Further

Fifty years of specialization in one particular branch of the oil business—*railway lubrication,* has developed Galena Oils to a state of perfection that they are recognized everywhere as the highest grade railway oils possible to manufacture.

But it is not the policy of this company to rest content with the creation of *better lubrication,* hence the development of *better lubrication service,* as exemplified in the master organization of specialists known as the Galena Mechanical Expert Department.

The co-operation offered through the medium of this exclusively Galena Service is daily proving its value on hundreds of railways, by invariably securing results in efficient and economical lubrication that show quickly in improved operation.

Just as the efforts of duplicating Galena Oils have failed through lack of *quality,* so likewise have the attempts to copy Galena Service been made ridiculous by absence of the vital essentials of knowledge and experience.

When Galena Service Goes In
Lubrication Troubles Go Out!

THE GALENA-SIGNAL OIL CO.
NEW YORK FRANKLIN, PA. CHICAGO
Offices in all principal American Cities
LONDON BUENOS AIRES PARIS

In important traffic areas, line repairs must be quick but slap-dash work will not do. Those repairs must hold

The New Form R-3 Sleeve

Where Good Splices Are Vital

Splices stay when the G-E splicing sleeve is used. It grasps the wire with a vise-like grip. The heavy toothed wedges hold tighter as the pull increases. A wire would break at some other point before one of these sleeves would give way.

This device is simple in construction and is easily installed. For emergency use it effects a quick, permanent splice without any kinking or twisting of the wire. It fits snugly over the trolley wire giving the wheel a smooth path. The addition of an adapter makes this sleeve an ear.

Place your order now—shipments from stock.

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Schenectady, N.Y.

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all large cities

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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Volume 57 New York, Saturday, April 30, 1921 *Number* 18

Lest We Forget the War Veterans

TWO years ago some four millions of men who had been wearing the khaki of the military service or the blue of the naval arm were in process of being discharged from the duties they had performed so splendidly and they were seeking to re-enter the normal fields of industry. To a very considerable extent, employers endeavored to take care of all returning former employees by reinstating them in their old jobs or supplying better ones. The great industrial activity of 1919 and the early part of 1920 made it comparatively easy for many others to find lucrative employment. Patriotic organizations helped by the exertion of every legitimate means to aid the returned soldiers to find jobs. Now the tide has turned. The industrial depression has resulted in the throwing of thousands of persons out of work, among them many former service men, and there has been increased activity on the part of the various organizations of veterans for bonus legislation and preferential treatment in civil service appointments.

Whether the payment of additional compensation in the form of a bonus to veterans is advisable at this time is debatable, but the street railways and manufacturing companies are in a position to help the situation to some extent by not forgetting to practice a reasonable amount of preference in the employment of veterans wherever it is possible to do so. While forces are not being increased to any extent at present, there is always a certain amount of turn-over, even in the dullest of times. It is worth remembering that these four million or so of young men spent months of anything but ease or comfort at an average wage of a trifle over $30 a month, while those who remained at home were seldom making less than that much per week, and in the great majority of cases far more. Hence it would appear that the ex-service man can well receive preference among two or more prospective employees, other conditions being equal.

Situation in New York City Reviewed

FOR those who wish to have a brief résumé of the New York transit situation, the review by Herman A. Metz, published elsewhere in this issue, should be most welcome. Mr. Metz has had an active part in much of the history which he recounts, having been Comptroller of the city of New York from 1906 to 1910, and he points out clearly that the only way to solve the problem is to take the question out of politics and find out what the present conditions are, and this the new commission is empowered to do.

The result of the active debate on Governor Miller's plan, both before and after the passage of the act, has been greatly to help the citizens of New York to understand the traction problem, and addresses by Mr. Metz and others have aided in this general education. The personnel of the new transit commission gives promise of a thorough study of the situation, coupled with an intelligent solution of it, although it may be expected that the city administration will exert every effort within its power to block the progress of the inquiry by legal means.

The traction situation in New York is admittedly complicated, involving as it does a large number of companies, some being lessors and others lessees, some being solvent and others not, and some being parties to special agreements with the city while others operate under franchises as old as any in the country. Nevertheless, similar problems, differing in complication only in degree, have been successfully solved in other cities in this country, and there is no reason to expect a failure in New York, once the commission gets to work.

A Budget Is Good, but It Need Not Be a Straitjacket

THE necessity for applying the brakes to operating expenses on electric railway properties has brought the budget to the fore as a factor in cost control. On many properties the budget system has been successfully used for a long time. It has helped them to keep going when without it they would not have known where they were headed until too late to change their course. On the other properties the budget plan has been installed recently, but is already bringing good results. There are still, however, many opportunities to inaugurate this plan.

To be successful a budget system must interest the individuals who actually control the spending of money. It is not sufficient for the manager and the comptroller to agree on the amounts that can be allotted to the several departments. Undoubtedly these officials have authority to tighten up on the pursestrings as they see fit, but they cannot inculcate and foster the spirit of real company thrift unless they can secure co-operation on the part of the ultimate spender. This is the factor which insures the success of budget plans like those used by the Boston Elevated Railway, the United Railways & Electric Company of Baltimore, the Cincinnati Traction Company and the Rochester & Syracuse Railroad, discussed in recent issues of this paper respectively by E. M. Flint. C. D. Emmons and W. C. Culkins, and in the present issue by D. E. Crouse.

Granted that the ultimate spender's interest in the budget must be secured, it is up to the management to enlist this interest. He must first be convinced of the necessity for economy and be inspired with a real desire to insure the profitableness of operation of the property. He must have demonstrated to him the reasonableness of the proposed limitations on his spending. And to crown it all he must know practically continuously just how well he is controlling the outgo, and must realize that if he makes good he will receive proper appreciation of his efforts.

At the same time there must be a flexibility to the budget. Circumstances arise which demand frequent readjustment. Shifting of allowances from department to department, with full consent of those concerned, may be necessary. This can easily be accomplished through co-operation, and only so.

In making the budget interesting, different means must be used. To some men graphic presentation, as used by Mr. Crouse's company, makes the strongest appeal. Others prefer "figures." They should have what they want as to form, just so the facts are made to grip them.

Schedules Committee Report Is to Be a Valuable Study

QUESTIONNAIRES sent out by the committee on economics of schedules of the T. & T. Association give promise of a valuable report on this important subject at the next convention. This committee has divided its work into three sections, the first covering definitions and analyses of car-hours and crew-hours, the second having to do with variable running time and the third with recent methods for improving handling of traffic in congested districts.

The discussion on the first subject at last year's convention developed the need for a standard classification of car-hours as between revenue and non-revenue time. One company was reported as having about 19 per cent of "bonus" time in the car-hours paid for. The burden of this on cost of operation is apparent. Benefits from a clearer understanding of the subject will be twofold. Executives should realize the desirability of regaining some of the costly working conditions which they have conceded to their employees in previous contracts, and it will be possible to get a real comparison between running time on various properties.

The second subject is somewhat allied to the above. It is undoubtedly true that many slipshod methods exist in the making of schedules, and it is hoped that the companies will agree upon more scientific methods for preparing time-tables and making changes promptly to suit traffic demands.

Methods developed in recent years for improving the handling of traffic in crowded centers are numerous, and while there may be good reasons for their nonadoption on certain properties, the committee may perform a useful service for the industry by calling attention to the arguments for and against their use in particular circumstances. Some of the methods listed in the committee's questionnaire are: Loading platforms, skipstops, safety zones, queue loading, double berthing, trailer cars, jitney control, street collectors, elimination of left-hand turns, semaphore control and turnbacks outside of congested districts. All these factors have a bearing on the movement of traffic as well as on the comfort, safety and convenience of passengers. If by the employment of one or more of these methods the car-hours can be reduced, the effect will be apparent on the cost of operation and incidentally on the rate of fare. Until a railway operator is convinced as to the effectiveness of such methods for the particular situation with which he is concerned he will not become an enthusiast. He must become a convert himself before he can convert city authorities or his patrons to the need for progressive methods.

The committee is doing well to stir up interest in such ideas, and when the matter gets around to a report before the convention a general discussion should be arranged with a view to getting the fullest possible light on the subject. The public must be educated to the fact that anything which facilitates the movement of traffic is in its interest.

"Don't Hate Your Customers" Is Good Advice to All

HOMELY principles of salesmanship formed the foundation of the talk of P. S. Arkwright, president of the Georgia Railway & Power Company, printed in last week's issue of this paper. This was a talk to platform men, but a careful perusal of it is recommended to all railway men, particularly managers and executives. It is none too strong to say that there are many of the latter who can, as advantageously as platform men, absorb some of this philosophy and expose themselves to the contagious enthusiasm of Mr. Arkwright. He calls attention to the one necessary element in any salesmanship activity when he points out with telling emphasis that the riders on the cars are the "customers." Not that this idea is new, but a good many people seem to have forgotten it. Confidence in, and respect for, a customer is one of the salesman's first requisites; this and the fact that he has something worth while selling and knows it makes his salesmanship possible. Mr. Arkwright would probably be the last man to claim or even admit that he is a salesman, but his talk is certainly the essence of salesmanship.

It is instructive to study the salesman-customer attitude in another business, namely, the hotel. The hotel, more than any other private business institution, approaches a public utility in its nature—it has service to sell only if and as it has capacity to furnish it. Obviously a room that is empty one night cannot be rented twice the next night to make up for it, any more than an empty car can carry a double load the next trip to make up the loss. Now who fails to notice the difference in manner of the hotel manager in the days when hotel rooms were at a premium and the days when there are more rooms than patrons? It is his manner under the latter conditions which is appreciated and which makes one want to come again.

A little more constant appreciation of these facts is worth while in the railway business. It means practicing salesmanship. It means conducting your business as if you had a competitor. It often means the difference between success and failure. Confidence in your customer, respectful treatment of him and appreciation of the value of what you have to sell him is worth while all down the line.

Executives Should Furnish Inspiration as Well as Education

THERE is an additional feature of the talk to platform men by Mr. Arkwright which is worth attention. It is another instance of the right sort of relation of executive to employee. Various examples have from time to time been mentioned in these columns, but it is a subject which cannot be overemphasized. There are two elements to this relationship. One is education and the other is inspiration.

The educational features—the giving of fact and viewpoint—of this talk are self-evident. But inspiring as the manner or wording may be, the full degree of inspiration can only be attained by the right sort of personal presentation. In this case it had this and railway men can usually give it. Many of them have come up through the ranks. They can talk in the language of the employee and from his point of view, and give him the necessary inspiration.

What is urged here is more constant practice of the act.

The Dull-Time Crop of Jitneys

THE number of jitneys in evidence is increasing very noticeably in many cities. This is undoubtedly a direct result of the widespread unemployment. Men who prospered during the flush times and bought automobiles, and are now out of a job, are getting into the free-lance jitney business as a temporary means of livelihood. Even in Terre Haute, Ind., where the frequent safety-car service supplied a competition that reduced the number of jitneys from more than 200 to nine not strictly competitive, there is now a considerable number of them engaged in picking up the nickels, with little regard for anything else. This flocking of the jobless into the jitney business is particularly noticed in those cities which permit them to operate without restriction as to route and schedule and free from bonds to cover liability in the protection of patrons and other users of the streets. Without any of the responsibilities of the street railway company, this dull-time crop of jitneys, coming as it does when there is a natural falling off in the traffic available, presents a competition that is glaringly unfair. It points to the desirability of securing such ordinances as will place the jitney competition on a fair basis.

The Place of the Engineer in the Electric Railway Organization

DUE TO wartime "suspended animation" in electric railway construction and rehabilitation, the engineer in this branch of industry has not been as conspicuous as he is normally. But he is there, nevertheless, and the work that he has been doing in maintaining the track, the rolling-stock and the power supply has been an important factor in the success of the railways in keeping up service under discouraging conditions. Good engineering will always form the basis of good transportation service, and a recognition of this fact by managers and the engineers themselves is necessary, not only in order that technical men retain their rightful place in the transportation field, but also because it is only thus that good quality of service can be insured.

In an address before the Cornell Society of Engineers, at a meeting held in New York City on April 21, Frank Hedley, president and general manager Interborough Rapid Transit Company, said some pertinent things about engineers. Mr. Hedley certainly knows engineers and engineering. He has to do so properly to select department heads for his great transportation machine. Moreover, he believes in engineers. Listen with the Cornell "grads" to what he says: "It is not essential for a man to have a technical college education. But this one thing is necessary. If he doesn't get his technical education in college he must get it after he starts to work. And it is difficult to get a technical education after putting in a hard day's work. The principal thing is that to be successful a man must show that he can do the job better than some one else, whether he has a college education or gets his technical training while doing practical work. A man who does this cannot be held back."

This paper believes with Mr. Hedley that the engineer is necessary in transportation work, and that the real engineer will forge ahead. The fact that he got his technical training in the railroad shop, and in construction and operating work, does not render Mr. Hedley oblivious to the advantages of the right kind of college training. But the main thing is to have real engineers in the business, college trained or otherwise.

And it is proper to add that, having them there, the "powers that be" should assign them a status commensurate with the importance of their work.

Fares Must Be Sufficient to Meet Depreciation

PUBLIC authorities in control of rates are gradually recognizing that utilities must make adequate provision for depreciation out of earnings and the consequent necessity that fares must be sufficient to permit substantial allowances for this purpose. In both the steam and electric railway industry there have been many examples of the fixing of rates by one body and the fixing of expenses by a second, as an arbitration board or national labor commission. But depreciation is an expense which accumulates without regard to either rate-fixing or expense-fixing bodies of any kind. The omission of depreciation from the year's expense account or from the balance sheet does not affect its existence in any way.

The trustees appointed to operate and administer the affairs of the Boston Elevated Railway under the public control act have met this issue squarely, as is indicated by the statements in their annual report, reviewed in the financial department of this issue. After recognizing the necessity of a change in policy as regards provision for depreciation, they state flatly that no sane management would fail to lay aside from current receipts a sufficient amount to meet renewal and replacement of property that is wearing out. They offer the public no immediate prospect of any decrease in the present 10-cent fare, giving among other reasons for the general advance in fare on practically all street railways this matter of depreciation.

There is nothing new about this situation as far as most of the men in the railway industry are concerned. The trouble has been that, with a shrinking margin between receipts and expenses, the managements have been compelled to seek some means of staving off bankruptcy. Other creditors could not be put off; depreciation allowances, but not the depreciation itself, could be.

The trustees are being subjected to criticism for this position by some elements of the public which are looking only for a possible wedge demanding fare reduction, but the fact should be recognized that every cent provided now for depreciation goes back to the public in better property, which means better service, and in the end the result will be a net saving to the public.

Quotation from the Federal Electric Railways Commission Report

No. 18

ALL transportation service is for the public. Jitneys and automobile buses cannot be repressed merely for the sake of compelling people to ride on the street cars . . . . Unnecessary and destructive competition ought not to be permitted, and the community at large should conserve the established facility that still is and promises to continue for an indefinite period the principal means of local transportation . . . If the street railways are to be allowed the benefits of even a qualified monopoly, they should be required to fulfill their obligations. They must render service that is adequate and convenient at rates that are attractive.

Budget System Which Produces Results

The Rochester & Syracuse Railroad Employs a Simple Means for Predicting Income and Outgo and for the Guidance of Department Heads in Limiting Expenditures—Graphical Presentation of Data Is Largely Used—Close Co-operation Throughout Executive Staff Supplements Budget

By D. E. CROUSE
Chief Engineer Rochester & Syracuse Railroad, Syracuse, N. Y.

FOR some time the Rochester & Syracuse Railroad has been using a budget system which has resulted in increased efficiency, better co-operation among departments and a general reduction in cost of maintenance that has well justified the small outlay on bookkeeping. The method used in building up the budget and the way in which the system functions are briefly as follows:

Preparation of the Trial Budget

Some time before the beginning of the calendar year for which the budget is being constructed the several departments of the company are furnished by the purchasing agent with a price sheet, of the general form shown in Fig. 1. This shows the latest prices of the several materials used by the particular departments for which the information is furnished and the quantities purchased during the current year. By the use of this sheet and comparison with similar previous sheets the department has a basis for arriving at an estimate of the cost of materials for the ensuing year.

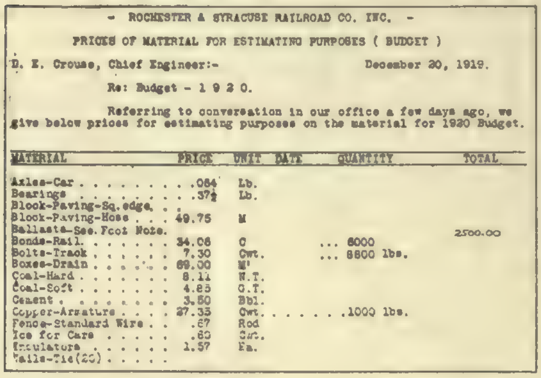
After a department head has made a careful analysis of the actual cost sheet for labor and material for the preceding year, which is made up in the form indicated in Fig. 2, he builds an estimate for the coming year and details the items which make up his proposed total expenditure.

We have found that unless department heads are furnished by the auditing department with the costs of materials and labor, itemized separately, they cannot analyze their costs correctly nor build up a budget intelligently.

After the department heads have set up their estimated expenditures under the several standard account numbers the trial budget is ready for criticism by the heads of other departments.

Testing the Trial Budget

The trial budgets are submitted to the scrutiny of the "cabinet," which consists of the auditor, the purchasing agent, the claim and tax agent, the general



- ROCHESTER & SYRACUSE RAILROAD CO. INC. -

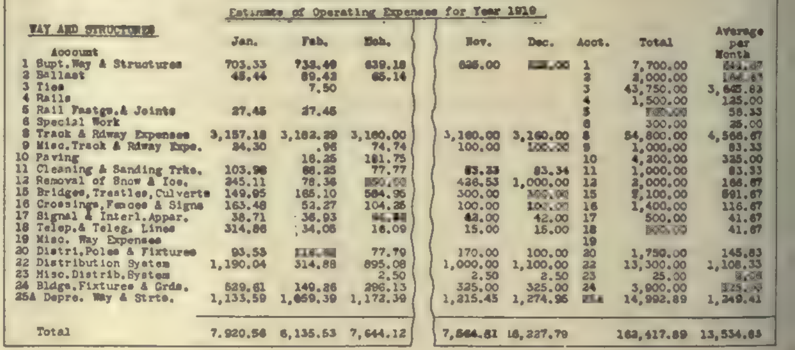
PRICES OF MATERIAL FOR ESTIMATING PURPOSES (BUDGET)

D. E. Crouse, Chief Engineer:- December 20, 1919.

Re: Budget - 1 9 2 0.

Referring to conversation in our office a few days ago, we give below prices for estimating purposes on the material for 1920 Budget.

MATERIAL	PRICE	UNIT	DATE	QUANTITY	TOTAL
Axles-Car	.084	Lb.			
Bearings	.37½	Lb.			
Block-Paving-Sq.edge.					
Block-Paving-Hose	49.75	M			
Ballasts-See.Foot Note.					2500.00
Bonds-Rail.	34.06	C		... 6000	
Bolts-Track	7.30	Cwt.		... 8800 lbs.	
Boxes-Drain	69.00	M'			
Coal-Hard	8.11	N.T.			
Coal-Soft	4.85	G.T.			
Cement	3.50	Bbl.			
Copper-Armature	27.33	Cwt.		.1000 lbs.	
Fence-Standard Wire	.67	Rod			
Ice for Cars	.60	Cwt.			
Insulators	1.57	Ea.			
Rails-Tie(20)					

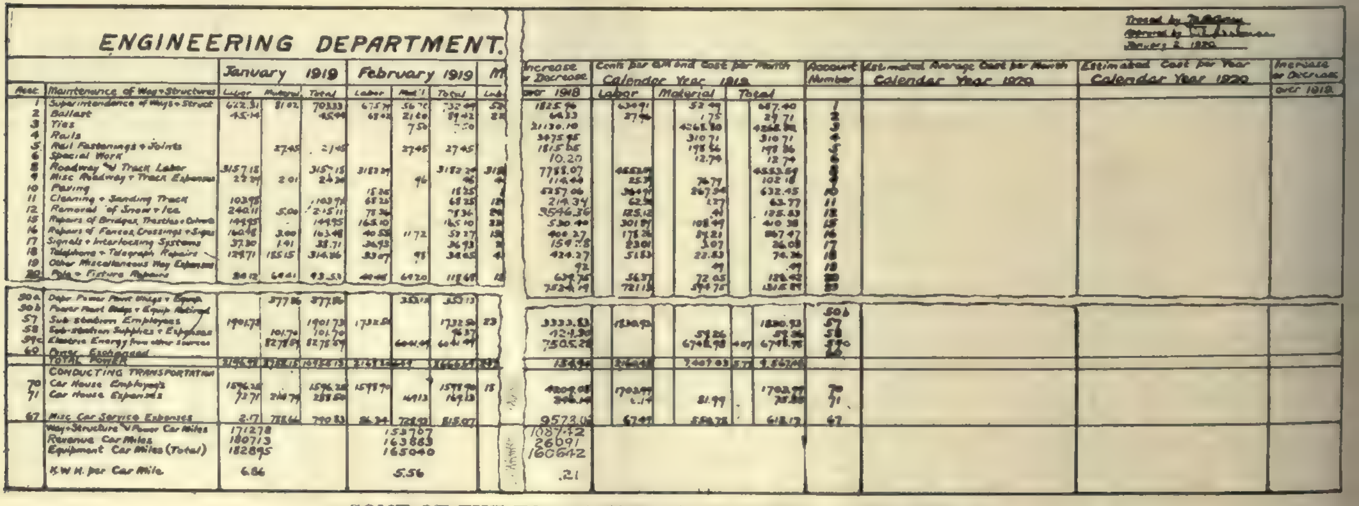


ROCHESTER & SYRACUSE RAILROAD COMPANY, Inc.

Estimate of Operating Expenses for Year 1919

WAY AND STRUCTURES

Account	Jan.	Feb.	Mch.	Nov.	Dec.	Acct.	Total	Average per Month
1 Supt.Way & Structures	703.33	733.40	639.18	626.00	[illegible]	1	7,700.00	[illegible]
2 Ballast	45.44	89.42	65.14			2	2,000.00	[illegible]
3 Ties		7.50				3	43,750.00	3,645.83
4 Rails						4	1,500.00	125.00
5 Rail Fastgs.& Joints	27.45	27.45				5	[illegible]	58.33
6 Special Work						6	300.00	25.00
8 Track & Rdway Expenses	3,157.18	3,182.29	3,160.00	3,160.00	3,160.00	8	54,800.00	4,566.67
9 Misc.Track & Rdway Expe.	24.30	.96	74.74	100.00	[illegible]	9	1,000.00	83.33
10 Paving		16.25	181.75			10	4,200.00	325.00
11 Cleaning & Sanding Trks.	103.98	65.25	77.77	83.33	83.34	11	1,000.00	83.33
12 Removal of Snow & Ice.	245.11	78.36	[illegible]	436.53	1,000.00	12	2,000.00	166.67
15 Bridges,Trestles,Culverts	149.95	165.10	584.96	300.00	[illegible]	15	7,100.00	591.67
16 Crossings,Fences & Signs	163.48	52.27	104.26	100.00	[illegible]	16	1,400.00	116.67
17 Signal & Interl.Appar.	38.71	36.93	[illegible]	42.00	42.00	17	500.00	41.67
18 Telep.& Teleg. Lines	314.86	34.05	16.09	15.00	15.00	18	[illegible]	41.67
19 Misc. Way Expenses						19		
20 Distri.Poles & Fixtures	93.53	[illegible]	77.79	170.00	100.00	20	1,750.00	145.83
22 Distribution System	1,190.04	314.88	895.08	1,000.00	1,100.00	22	13,300.00	1,108.33
23 Misc.Distrib.System			2.50	2.50	2.50	23	25.00	[illegible]
24 Bldgs.Fixtures & Grds.	529.61	149.26	296.13	325.00	325.00	24	3,900.00	[illegible]
25A Depre. Way & Strts.	1,133.59	1,059.39	1,172.39	1,215.45	1,274.96	[illegible]	14,992.89	1,249.41
Total	7.920.56	6,135.53	7,644.12	7,564.81	18,227.79		162,417.89	13,534.83



ENGINEERING DEPARTMENT.

January 1919 — February 1919

Acct. Maintenance of Way + Structures — Labor, Material, Total

Increase or Decrease over 1918 — Cents per CM and Cost per Month Calendar Year 1919: Labor, Material, Total — Account Number — Estimated Average Cost per Month Calendar Year 1920 — Estimated Cost per Year Calendar Year 1920 — Increase or Decrease over 1919

1 Superintendence of Ways + Struct.
2 Ballast
3 Ties
4 Rails
5 Rail Fastenings + Joints
6 Special Work
8 Roadway + Track Labor
9 Misc Roadway + Track Expenses
10 Paving
11 Cleaning + Sanding Track
12 Removal of Snow + Ice
15 Repairs of Bridges, Trestles + Culverts
16 Repairs of Fences, Crossings + Signs
17 Signals + Interlocking Systems
18 Telephone + Telegraph Repairs
19 Other Miscellaneous Way Expenses
20 Pole + Fixture Repairs
50a Depr. Power Plant Bldgs + Equip.
50b Power Plant Bldgs + Equip. Retired
57 Sub-station Employees
58 Sub-station Supplies + Expenses
59c Electric Energy from other sources
60 Power Exchanged
TOTAL POWER
CONDUCTING TRANSPORTATION
70 Car House Employees
71 Car House Expenses
67 Misc Car Service Expenses
Way + Structure + Power Car Miles — 171278 — 153707
Revenue Car Miles — 180713 — 163883
Equipment Car Miles (Total) — 182895 — 165040
K.W.H. per Car Mile — 6.86 — 5.56

SOME OF THE FORMS USED IN COMPILING BUDGET DATA

Fig. 1 (Upper, left)—Materials price sheet furnished to department heads. Fig. 2 (Lower)—Chart used by department heads in forecasting expenditures. Fig. 3 (Upper, right)—Auditor's summary of estimates of operating expenses.

traffic agent, the superintendents and the chief engineer, all under the direction of the general manager, who acts as presiding officer. At a meeting of the cabinet each department head submits his trial budget of expense and describes in detail the method used in arriving at the proposed amount for each account. He then has to show proof why his estimated amount should be allowed to stand.

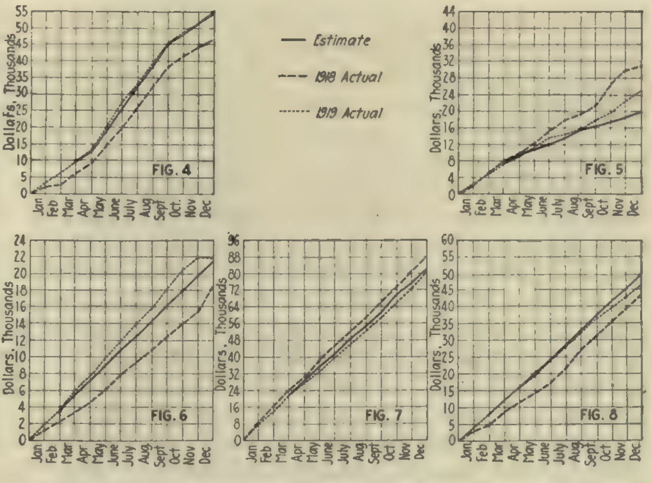
As the usual criticism of the cabinet is in the direction of downward revision of estimates it is obviously necessary that the department head be well fortified if he desires to have his estimates approved.

In the discussion of the proposed expenditures such items as wage contracts and their upward or downward revision, materials costs and the trend of the materials market, weather conditions, etc., are all brought into review. After a budget system has been in effect for several years much good material is available in the records to serve as ammunition for the cabinet to use in bombarding the head who is trying to get his estimate through, so that he is distinctly on the firing line while this procedure is going on.

After the cabinet has arrived at a tentative expense budget the earnings for the ensuing year are estimated. To some it may seem to be a waste of time to estimate future earnings, but it is a fact that in the last budget set up by this company the gross earnings were forecasted within 1 per cent of the actual. It is, in our opinion, just as necessary to set up a bogey for earnings of the traffic department as it is to fix one for the expenses of the mechanical, the way and the power departments.

Obviously, when the earnings as well as the expenses are estimated, it is possible to set up a proposed net income, which after all is the real goal in operation.

With us, after the trial budget has been accepted after revision by the cabinet, the department head turns over his estimate to the auditor, who assembles the budgets.

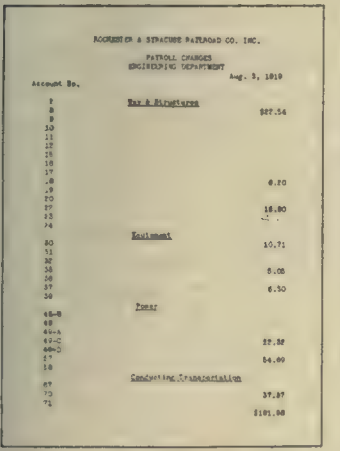


GRAPHICAL REPRESENTATION OF ESTIMATED AND ACTUAL EXPENDITURES BY ACCOUNTS

Fig. 4—Account No. 8, roadway and track labor.
Fig. 5—Account No. 33, electrical equipment of cars.
Fig. 6—Account No. 57, substation employees.
Fig. 7—Account No. 59C, electrical energy.
Fig. 8—Account No. 64B, passenger conductors.

The budget is spread over the year by months, as indicated in the form reproduced in part in Fig. 3. The estimates are put into graphic form, graphs being plotted for each expense item by account number and also for the earnings. Sample graphs are reproduced in Fig. 4 to 8 inclusive. The diagrams show the actual figures for the preceding year and the estimates for the current year. The actual expenditures for the current year are then plotted in as the year advances and serve as a splendid check on variations from the budget estimate.

The efficacy of a budget system depends, of course,



ROCHESTER & SYRACUSE RAILROAD CO. INC.

PAYROLL CHARGES
ENGINEERING DEPARTMENT

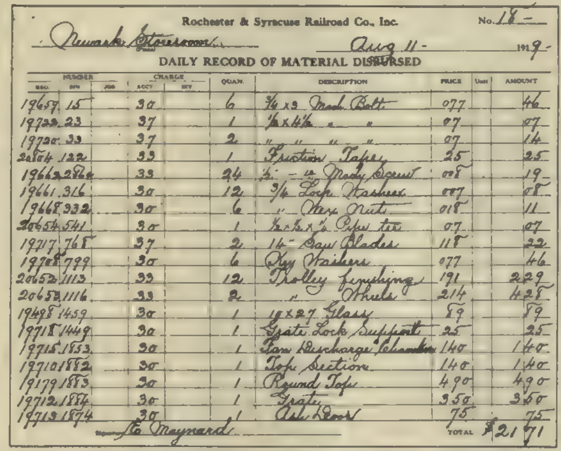
Account No.

Way & Structures

Equipment

Power

Conducting Transportation



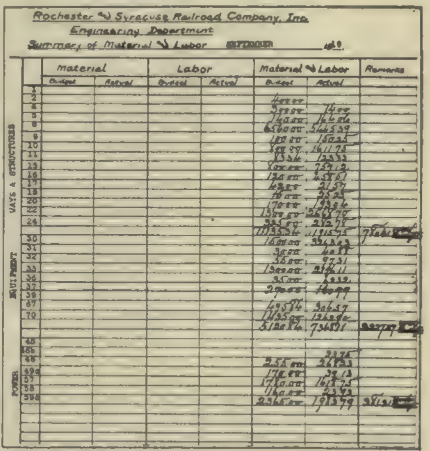
Rochester & Syracuse Railroad Co., Inc. No. 18

Newark Storeroom Aug 11 - 1919

DAILY RECORD OF MATERIAL DISBURSED

NUMBER			CHARGE		QUAN.	DESCRIPTION	PRICE	Unit	AMOUNT
		JOB	ACCT	DIV					
19657	15		30		6	3/4 x 3 Mach. Bolt	077		46
19722	23		37		1	1/2 x 4 1/2 " "	07		07
19720	33		37		2	" " " "	07		14
20604	122		33		1	Friction Tape	25		25
19662	286		33		24	1/2 - 4 Mach. Screw	008		19
19661	316		30		12	3/4 Lock Washers	007		08
19668	332		30		6	" Hex Nuts	018		11
20654	541		30		1	1/2 x 1/2 x 1/2 Pipe tee	07		07
19717	768		37		2	14" Saw Blades	118		22
19708	799		30		6	Key Washers	077		46
20652	1113		33		12	Trolley Bushing	191		229
20652	1116		33		2	" Wheels	214		428
19498	1459		30		1	19 x 27 Glass	89		89
19718	1449		30		1	Grate Lock Support	25		25
19715	1853		30		1	Fan Discharge Chamber	140		140
19710	1882		30		1	Top Section	140		140
19179	1883		30		1	Round Top	490		490
19712	1884		30		1	Grate	350		350
19713	1874		30		1	Ash Door	75		75

Maynard TOTAL $21 71



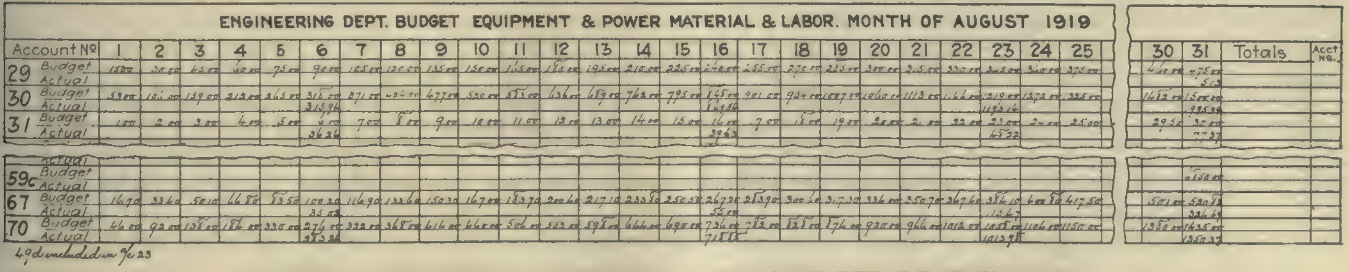
Rochester & Syracuse Railroad Company, Inc.
Engineering Department
Summary of Material & Labor 19

	Material		Labor		Material & Labor		Remarks
	Budget	Actual	Budget	Actual	Budget	Actual	

WAYS & STRUCTURES

EQUIPMENT

POWER



ENGINEERING DEPT. BUDGET EQUIPMENT & POWER MATERIAL & LABOR. MONTH OF AUGUST 1919

Account No. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 30 31 Totals Acct No.

29 Budget / Actual
30 Budget / Actual
31 Budget / Actual
59c Budget / Actual
67 Budget / Actual
70 Budget / Actual

49d included in a/c 23

FAMILIAR RECORDS TO ROCHESTER & SYRACUSE DEPARTMENT HEADS

Fig. 9 (Upper, left)—Sample daily list of payroll charges furnished by auditor to the several departments.

Fig. 10 (Upper, middle) — Sample daily record of materials drawn from the storeroom.

Fig. 11 (Upper, right)—Sample summary sheet for daily comparison of expenditures with budget by account numbers.

Fig. 12 (Lower)—General summary sheet for engineering department for typical month.

on the follow-up system. My belief is that there should be a daily check of expense items. When such a check is provided it is possible to control the expense, whereas if a check is made only weekly or monthly it will usually be found that it is too late to adjust the account, the bulk of the money having already been spent. On our property department heads are furnished by the auditor with daily statements of labor expenditures charged to each account number, and also copies of disbursement sheets showing the consumption of material (see Figs. 9 and 10). From these data the labor and materials items are entered on forms like that reproduced in Fig. 11. This is done daily and the expenditures are checked against the budget. A monthly summary, such as that illustrated in Fig. 12, is made up from these sheets.

In our case the department heads meet every two weeks at the general manager's office and review the budget. Hence the system serves not only to permit checking against the budget, but it forces the engineering and mechanical departments to keep themselves constantly advised of the expenditures which they are making, and as to the relation of these expenditures to the other expenditures on the property. The technical departments are mentioned specifically because their expenditures are subject to the greatest variations and control and therefore are most readily amenable to the budget system. Our plan also produces very close co-operation among the department heads as a whole, and the good-natured discussion of proposed expenditures tend to maintain a fine *esprit de corps* in the organization as a whole.

Reliability of the Automatic Substation

Experience of New York State Railways with Automatic Substation Demonstrates Dependability of Automatic Control with Reasonable Care in Inspection and Maintenance—Latest Operating Data Are Given

FOR more than two years the New York State Railways has had in operation an automatic substation on the Rochester & Sodus Bay line at Williamson, which is about 30 miles from Rochester. Details of the construction and operation of this substation were given in a paper by C. L. Cadle before the New York Electric Railway Association, abstracted in the issue of the ELECTRIC RAILWAY JOURNAL for Dec. 20, 1919. The New York State Railways has furnished some recent data as to the operation of the Williamson substation, as follows:

The cost of this substation, one of 250-kw. capacity, which was commissioned in February, 1919, was slightly more than $17,000, of which about one-third was for land and buildings, the remainder being for substation equipment and installation, including supervision. The annual cost of operation is $3,263, which is nearly $5,000 less than would be required for manual operation. The annual cost includes 10 per cent depreciation and fixed charges for land and buildings, $598; 15 per cent for depreciation and fixed charges on machinery, $1,219; actual repairs to equipment, $827; inspection and maintenance, $619. A reactance coil costing $535 was also installed during 1920, which belongs, of course, in the capital account.

During the past year interruptions to service caused by automatic equipment covered 207½ hours, and those due to other causes totaled 137½ hours, a total of 345 hours. The interruptions due to the equipment are subdivided roughly as follows: Relay failures, eight in number, average duration of interruptions, eight hours and five minutes; interlock failures, two interruptions, eleven hours and fifteen minutes; direct-current resistor failures, one interruption, forty-three hours and forty-five minutes; speed-limit-device failures, two interruptions, averaging each fifty-two hours and twenty minutes. External interruptions were due to line trouble, falling of trolley wires, failure of alternating-current power, failure of remote-control apparatus and failure of train dispatcher to cut in remote control.

The inspections given the automatic substation comprise a casual daily "once-over" and a thorough weekly inspection. An employee of the company who lives near by changes record charts and spends a total of one and one-half hours in this duty and in watching the operation, looking, of course, at all parts of the equipment. A "relief operator" spends one day each week in making a thorough inspection, tidying up the substation and filling in the record forms.

As the relief man goes over the apparatus, part by part, he fills in blank spaces on a question form which covers all details of equipment. For example, on the oil switch are these questions: Are all fulcrum pins and cotter pins placed and in good condition? Are all nuts and screws set tight? As to the oil switch mechanism, these are some of the questions: Are all nuts, setscrews and springs tight and in good condition? Are all electrical contacts tight? Are all contacts and fingers clean and in good condition? Is operation satisfactory? In all, a total of about seventy-five questions are asked.

A weekly report on interruptions is also made on an appropriate form, giving, with respect to each interruption, the date, the times of the beginning and ending of each interruption period, the duration and the cause. Space is allowed on the form for explanation, etc.

Special Library Co-operation in Boston

THE special libraries maintained by the Boston (Mass.) Elevated Railway and Stone & Webster have united with those of nine other companies in Boston representing various fields of industry, business and research in the publication of a "Union List of Periodicals and Annuals" taken by the several members of the agreement. This list comprises 750 individual publications, some of which, being extremely specialized or little known outside of particular industries, are often hard to find when wanted for immediate reference. Included, also, are all the well-known technical and trade papers, and the published proceedings of various technical, research and business organizations. The list is sold for a nominal price, which covers the cost of printing only.

By means of this list, and other co-operative measures which they employ, the librarians, or information experts as they really are, are able to secure from each other, by telephone or messenger service, the very latest published information on an extremely wide range of subjects which may be called for at any moment by the business executives whom they serve.

Lewis A. Armistead and George Winthrop Lee, special librarians respectively of the Boston Elevated Railway and Stone & Webster, were largely instrumental in the compilation and publication of the "Union List of Periodicals and Annuals."

The Automatic Substation in Electrolysis Mitigation

Results of Special Investigation Made for Scientific Purposes at Des Moines, Iowa, by the Bureau of Standards Confirm Theoretical Conclusion that Increase in Number of Feeding Points Made Possible by Automatic Control Acts to Reduce Track Gradients and Potentials

By E. R. SHEPARD
Electrical Engineer United States Bureau of Standards, Washington, D. C.

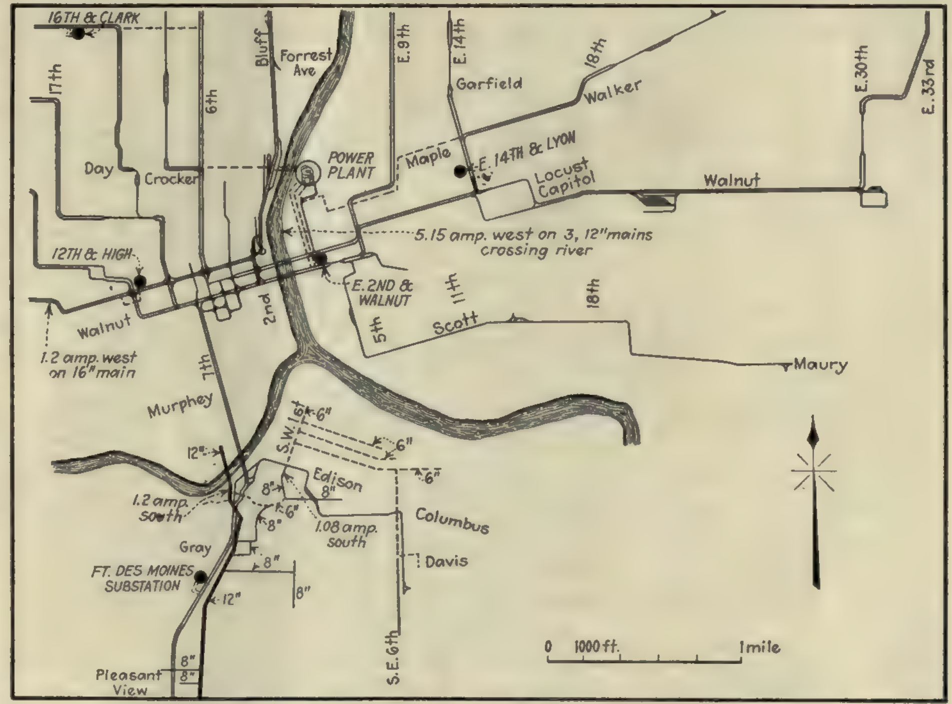


PLATE 1—CHART SHOWING CURRENT FLOW IN WATER MAINS

AMONG the various methods of electrolysis mitigation which have been proposed and used, the use of multiple-feeding points for railway current is considered of primary importance. The practical limit in the number of feeding points is usually set by operating costs, but with the advent of automatic control for railway substations the number of feeding points which can be economically employed has considerably increased. While automatic substations are being installed by railway companies primarily for economic reasons, improved electrolysis conditions will generally follow their installation.

The Des Moines (Iowa) City Railway recently brought to a practical completion a system of automatic substations which is the most extensive for strictly urban use in the country. The engineers of the Bureau of Standards therefore considered that a thorough study of the Des Moines system, with particular reference to the electrolysis situation, would be of technical and scientific value and interest.

The Des Moines City Railway and other public utility companies in the city of Des Moines were informally consulted regarding this matter in the spring of 1919 and all agreed to co-operate in a general study of the situation. An investigation, started in September of that year, was carried out under the direction of an engineer of the United States Bureau of Standards. This was made possible through the hearty co-operation of F. C. Chambers and K. J. Keith of the railway company, H. V. Smith and G. Ireland of the Iowa Telephone Company, A. T. Luce of the Des Moines Water Company, H. R. Sterrett of the Des Moines Gas Company, J. M. Pilmer of the Des Moines Electric Company and F. R. Porter of the Western Union Telegraph Company. The necessary technical and field help was furnished by the first-mentioned three companies.

Practically no data are available showing electrolysis conditions prior to the installation of the automatic substations. From all accounts, however, very high over-all potentials existed on the track system as well as high potential differences between tracks and pipes. Measurements previously made were understood to reveal current flow on water main and potential differences which would ordinarily be considered very bad, but an examination of the pipes had shown practically no corrosion. The latter circumstance was attributed to the high resistivity of the soil in the city. The water pipes were electrically drained to the tracks by the negative bus at the power house, and it is said that very heavy currents were carried. The telephone cables were drained to the negative return feeders at several points.

Prior to the present installation of automatic substations, the Des Moines City Railway was supplied from a single feeding point at East Second and Maple Streets, involving feeding distances of 3 miles or more. Now there are six automatic substations in the city and two automatic and one manually operated substations on near-by interurban lines. Each city substation contains one 500-kw. rotary converter. With the exception of the Fair Ground line at East Walnut Street there is no feeding distance more than about 7,000 ft. With the 85 miles of single track operated by the company, including the interurban line, the mileage of track per substation is under ten.

In addition to the substations there is a rotary converter at the power house on East Second and Maple Streets, which carries the night load after the substations have shut down.

The substations at Twelfth and High Streets and at East Second and Walnut Streets operate only during the peak loads, while the other substations operate approximately nineteen hours per day. The operating voltage at the outlying stations is 650, that at the Sixteenth and Clark Streets and at East Fourteenth and Walker Streets substations is 625, while the peak load substations operate at 600 volts. This voltage adjustment is based on peak-load conditions and enables all six substations to carry their proper portions of the load during the peak. As the load drops off, the stations operating at the lower voltages are the first to shut down. In order to prevent the two peak-load stations from coming on and off unnecessarily, the switches in the high-voltage lines which supply them are closed only after the traffic becomes sufficiently great to enable the stations to stay in under the fluctuating load. The load curves of the several stations are shown on page 808, Figs. 2 to 7, and the total system load in Fig. 8. These were determined for a typical day from measurements made on the high-voltage lines, with corrections for transmission and conversion losses. They are only approximately correct.

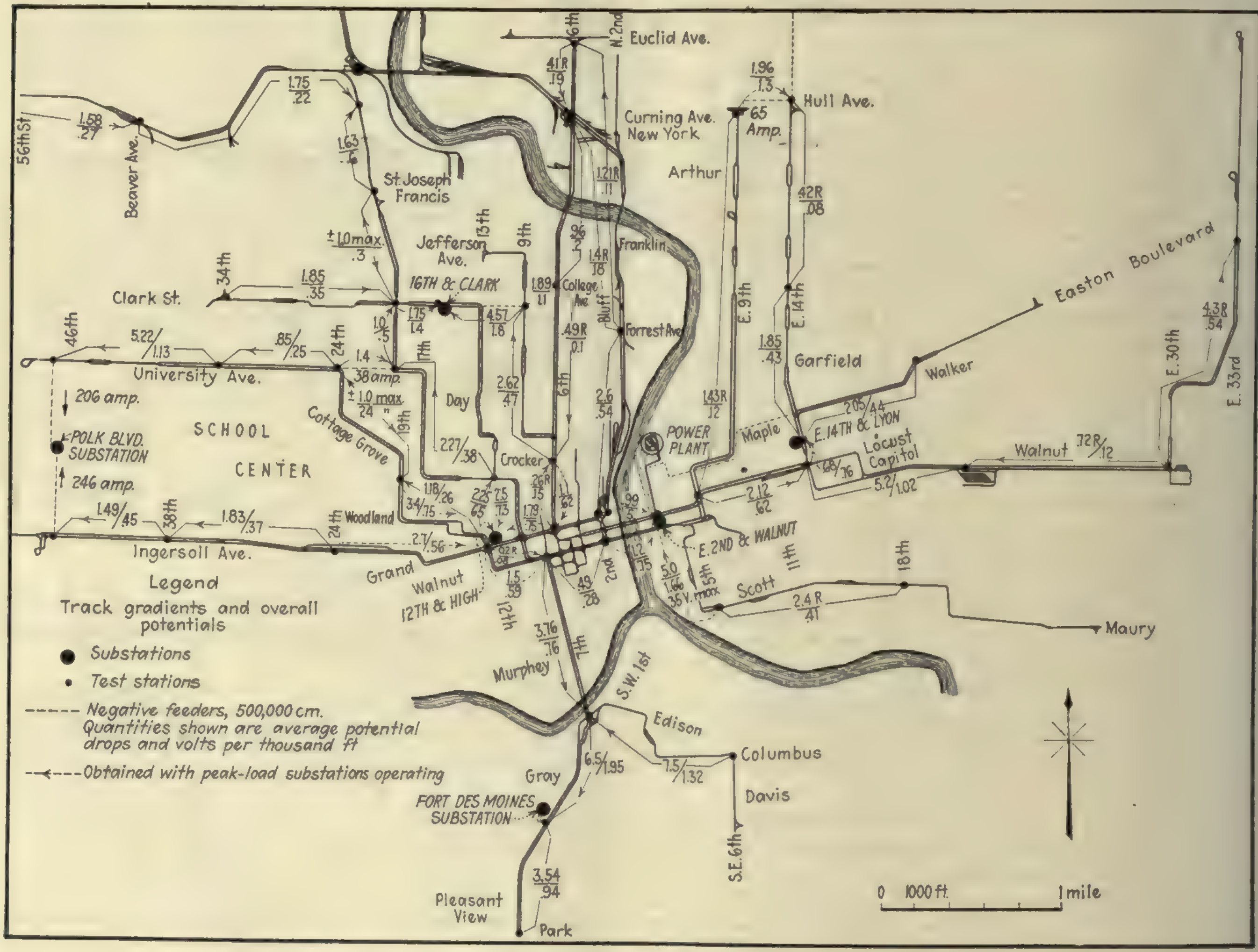


PLATE 2—RESULTS OF SURVEY OF TRACK POTENTIALS AND GRADIENTS

In the tests, track gradient and over-all potential measurements were made by the aid of about fifty pilot wires loaned by the Iowa Telephone Company. These wires were connected to the tracks at the points indicated in Plate 2. They terminated in the telephone company's exchange on binding posts installed on a map of the railway system, at points corresponding to the actual field locations. The results of the measurements are graphically shown on Plate 2.

The average values of the over-all voltages are practically all under 10 volts. Some unusually high values were observed for short periods, but these conditions were admittedly due to poor bonding. A high gradient was observed on University Avenue, between Thirty-fourth Street and Forty-sixth Street, where the negative feeder from the Polk Boulevard substation connects with the track. This was undoubtedly caused by bad track conditions.

The highest gradient observed in the city was that on the Fort Des Moines line between the substation and the Raccoon River, a distance of about 3,000 ft. Here the gradient was about two volts per 1,000 ft., due not to poor track conditions but to the very heavy load carried by this substation. The tracks adjacent to the Sixteenth and Clark Streets substation are also heavily loaded, the gradients being 1.4 and 1.8 volts per 1,000 ft. However, as the distances over which these heavy gradients exist are comparatively short, the electrolysis conditions are by no means as serious as those surrounding the Fort Des Moines substation. In all other sections the gradients are comparatively low and within limits usually considered satisfactory.

POTENTIAL DIFFERENCE MEASUREMENTS

Potential difference measurements between water hydrants and tracks were made in about seventy-five locations, half-hour records being obtained with recording instruments. The results are shown in Plate 3. In the downtown districts measurements were made with and without the peak-load substations operating and both measurements are recorded on Plate 3.

The effect of the poor track on University Avenue is seen in the positive value of 2 volts as compared with 0.24 volt on Ingersoll Avenue. This condition can undoubtedly be greatly improved by repairing all defective bonds on University Avenue.

On the Fort Des Moines line average potential differences between pipes and track as high as 7 volts were observed. There are several factors which mitigate this apparently bad condition, which will be referred to later. In the Sixteenth and Clark Streets substation district the maximum positive voltage observed was 1.6 volts and in the East Fourteenth and Walker Streets district the maximum positive value was 0.96 volt. In the downtown district a generally negative condition on the pipes prevails when the peak-load stations are not operating, and a positive condition of about 0.25 volt prevails during the period when they are operating. Potential difference measurements between various cable systems and other structures were made in a number of locations. As the drainage of the telephone cables had not been adjusted to the present railway distributing system, they were found to be positive to the earth in all substation districts. It is only during recent months that the substation installation has been completed and put in normal operation.

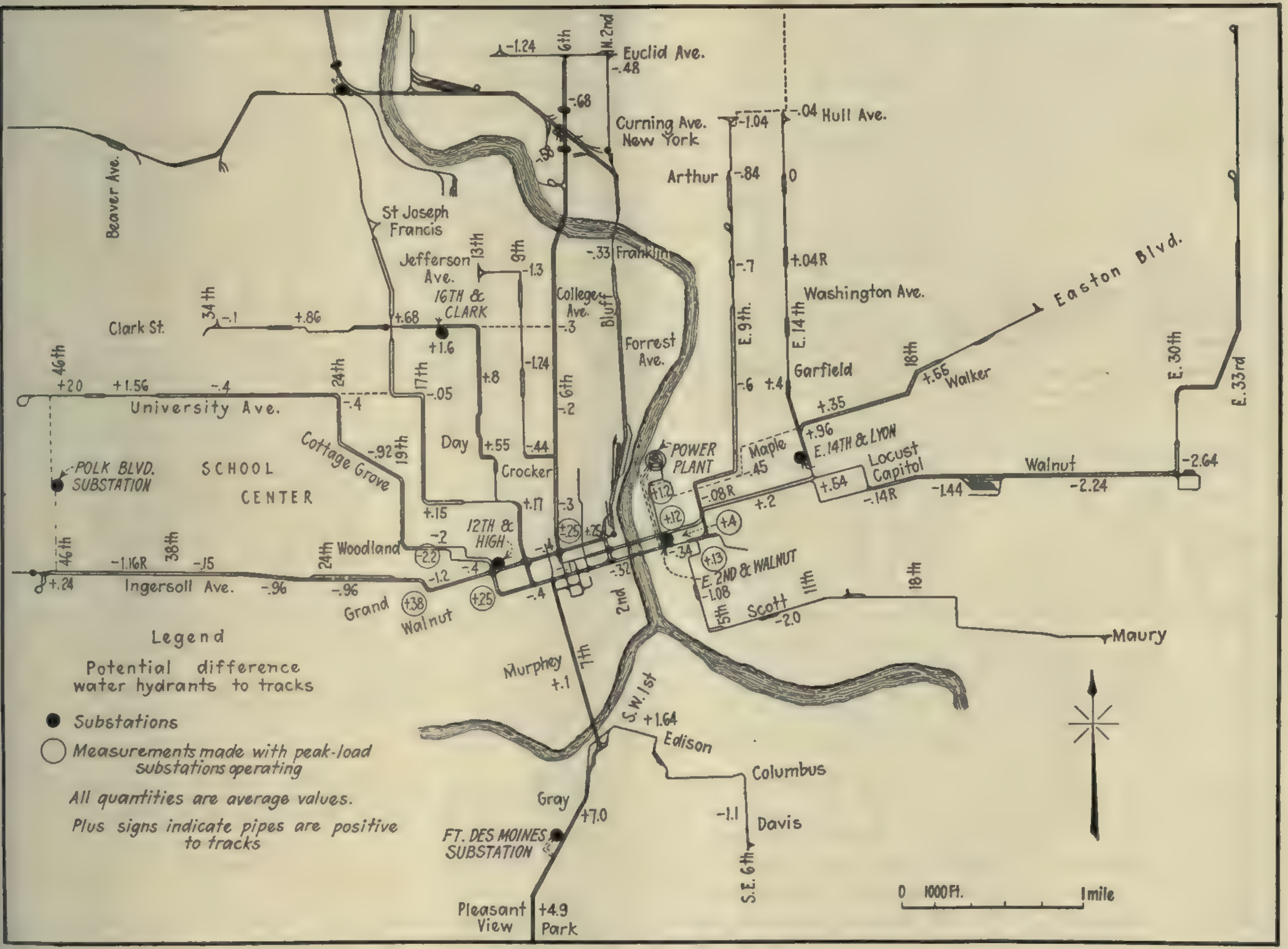


PLATE 3—RESULTS OF POTENTIAL DIFFERENCE MEASUREMENTS BETWEEN WATER HYDRANTS AND TRACKS WITH AND WITHOUT PEAK-LOAD SUBSTATIONS OPERATING

It was generally agreed in the discussion of this subject that the cables should be drained at all substations, but only during such periods as the substations operate. Such an arrangement will require the installation of an automatic switch, at each substation, which will be actuated from the terminals of the rotary converters, so as automatically to connect the drainage cables to the negative busbar during the period of operation. The railway company will install such switches.

It is presumed that the railway will extend a common drainage cable from each such switch to some point convenient for all cable-owning companies to connect to it. It is proposed that the telephone company should install a No. 0000 copper drainage wire in each substation district, employing aërial sheaths when necessary to reach the underground plant. Measurements will be made by other cable-owning companies to determine whether their cable system needs drainage.

CURRENT FLOW IN WATER MAINS

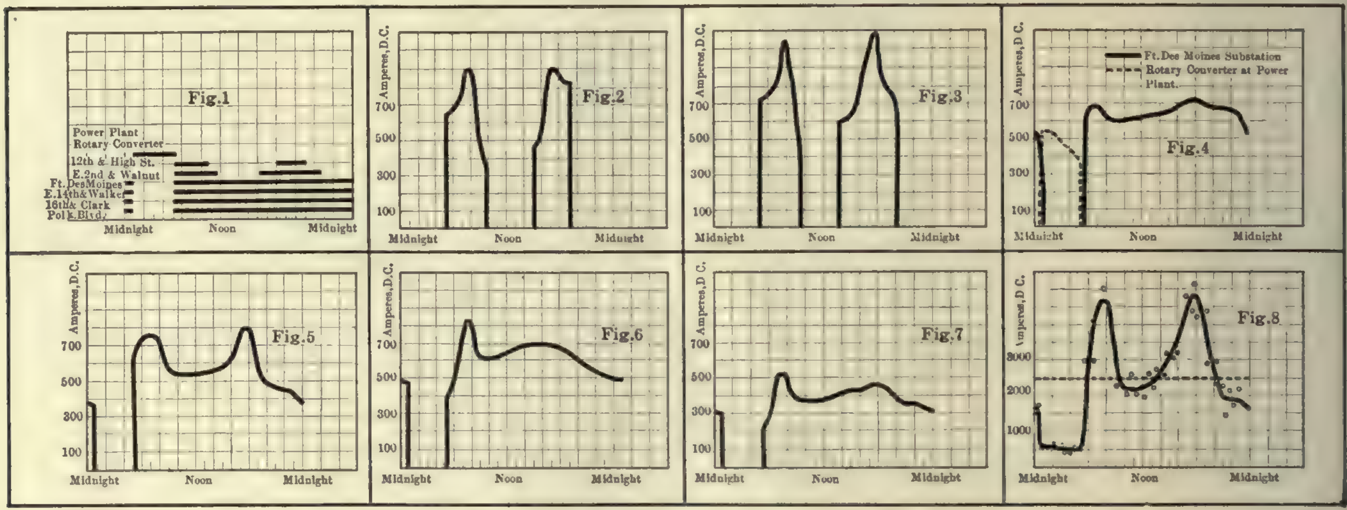
Measurements of current flow in water mains were made in six locations, the more important of which are shown in Plate 1. All of these currents were small, the largest being 5.15 amp. on three parallel 12-in. cast-iron mains which crossed the Des Moines River on Locust Street.

The highly positive piping system south of the Raccoon River, shown in Plate 1, is supplied by only two water mains from the north, one a 12-in. cast-iron main crossing the Raccoon River at southwest Ninth Street and the other an 8-in. main on southwest First Street. These pipes were found to be carrying 1.2 amp. and 1.08 amp. respectively. As the railway load from the south is comparatively small, and as the distribution water system is not extensive, it is not likely that any appreciable current is carried into this positive area over the main from the south.

Five soil samples were collected by Mr. Sterrett of the gas company from open trenches in the downtown district and were tested for resistivity. These had an average resistivity of 3,100 ohms for 1 cu.cm. as received, and 1,800 ohms when the samples were saturated with moisture. The latter figure is about three times that for the resistivity of New Orleans soil and about twice that for the soil in the downtown district in St. Louis, but considerably lower than that for Washington and Philadelphia soils. The earth south of the Raccoon River along the Fort Des Moines lines is undoubtedly of a much higher resistivity than the samples tested.

It is apparent from the results of the tests that electrolysis conditions in general have been greatly improved by the installation of the several substations. With one or possibly two exceptions track gradients and over-all track potentials will be reduced to satisfactory values when all the tracks are properly bonded.

The one location where gradients appear to be excessive is south of the Racoon River along Fort Des Moines line. Considering the small amount of current entering the piping system adjacent to the Fort Des Moines station, caused probably by the relatively high resistance of the earth in this locality, the high potential differences observed are not to be taken as a measure of the hazard involved. However, as the current discharged may be largely concentrated at the few points where mains cross under the tracks, it seems desirable to reduce the potential difference between the pipes and the tracks in this area. This could be done either by the use of a 1,000,000-circ.mil insulated negative feeder from the Fort Des Moines substation to the junction point on the tracks south of the Raccoon River, or by a moderate amount of pipe drainage under proper control and supervision.



CHARACTERISTICS OF RAILWAY POWER LOAD AT DES MOINES, IOWA

Fig. 1—Normal periods of operation of automatic substations.
Fig. 2—Station load curve, Twelfth and High Streets.
Fig. 3—Station load curve, East Second and Walnut Streets.
Fig. 4—Station load curve, Fort Des Moines substation and rotary converter at power plant.
Fig. 5—Load curve of converter substation at East Fourteenth and Walker Streets.
Fig. 6—Station load curve, Sixteenth and Clark Streets.
Fig. 7—Station load curve, Polk Boulevard.
Fig. 8—Total railway load.

If the first plan were used, the feeder would be 3,000 ft. long, and a resistance would be inserted between the negative bus and the adjacent track to give a potential drop of 10 volts between the track and the negative bus. This would involve an investment cost of $2,400 and an annual cost of $590 for power at one cent per kilowatt-hour.

A similar calculation was made for reducing the potentials in the vicinity of the Sixteenth and Clark Streets substation, although the need of improvement there is not as great as in the other case. Here a 500,000-circ.mil cable 4,000 ft. long with the necessary resistance taps would cost about $1,650 and the annual power cost would be $235.

The pipe drainage would be less expensive, but if this plan is to be employed in the district south of the Raccoon River, a preliminary test is suggested to see if the potential of the pipe can be lowered to proper values without excessive drainage current and to determine if practicable whether any objectionably high resistance joints exist in the 12-in. water main on southwest Ninth Street.

In conclusion it may be said that as a general policy it is very desirable that voltage measurements and inspections should be made from time to time on all cable and piping systems, as changing load conditions and the failure of rail bonds and drainage bonds are more than likely to establish bad local electrolysis conditions.

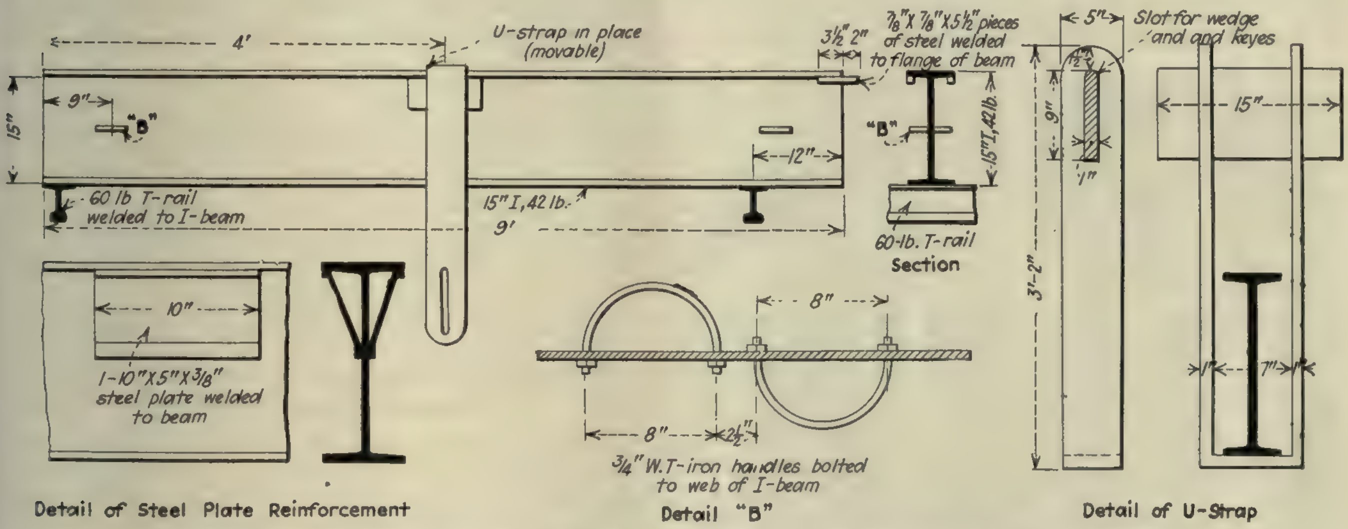
The importance of track maintenance cannot be too strongly emphasized. This is the prime requisite for good electrolysis conditions and without it no system of mitigation is entirely effective in protecting underground structures.

The American Society of Civil Engineers at its 1921 annual meeting accepted the offer of *Engineering News-Record* to establish an "Arthur M. Wellington Prize" to be awarded annually for the best paper presented before the society on any phase of the science and art of transportation. The prize is a memorial in honor of a former editor of *Engineering News* and the author of the well-known book entitled "The Economic Theory of Railway Location."

Rehabilitating Track in Massachusetts

Welding in Various Ways Is Used on a Large Scale—During 1920 the Sum of $1,600,000 Was Spent on Trackwork—Vertical Rail Benders Have Been Perfected—Lighter Track Considered Possible Owing to Extensive Use of One-Man Cars

WELDING will be used extensively for joint maintenance on the property of the Eastern Massachusetts Street Railway during 1921. An extended account of the track maintenance methods followed during 1919 and 1920 on this property was given in a paper presented at a meeting of the New England Street Railway Club on Dec. 2 by Frank B. Walker, engineer maintenance-of-way of the company. This paper was published in abstract on page 1237 of the issue of the ELECTRIC RAILWAY JOURNAL for Dec. 18, 1920, but further particulars will be of interest. A table showing the work done during the past two years is given below:


4'
U-strap in place (movable)
9"
"B"
15"
60 lb T-rail welded to I-beam
15" I, 42 lb.
9'
12"
⅞"X⅞"X5½" pieces of steel welded to flange of beam
3½ 2"
15" I, 42 lb.
60-lb. T-rail Section
10"
1-10"X5"X⅜" steel plate welded to beam
8"
8"
2½"
¾" W.T-iron handles bolted to web of I-beam
5"
Slot for wedge and keyes
9"
1"
3'-2"
15"
1"
7"

Detail of Steel Plate Reinforcement

Detail "B"

Detail of U-Strap

VERTICAL RAIL BENDER FOR HEAVY RAILS. THE COMPANY USES A LIGHTER TYPE FOR RAILS UP TO 75 LB. PER YARD

TRACKWORK DONE 1919–1920

	1919	1920	Total
Track relaid (feet)	63,560	155,121	218,681
Track overhauled (feet)	*423,520	*472,469	*895,998
Ties installed	98,273	105,252	203,525
Joints Lorain welded	2,333	6,978	9,311
Joints Lincoln welded	306	6,590	6,896
Joints thermit welded	112	1,658	1,770
Joints having new angle bars	No report	1,348	1,348
Joints having surface bends removed	None	10,777	10,777
Joints surface welded	No report	11,475	11,475
Joints bonded	12,771	21,311	34,082
Pieces special work put in	129	479	608

*This figure is larger than it otherwise would be owing to the fact that during part of the time covered some of the reports covered track on which minor repairs only were made.

The cost of the work done during seven months of 1919 was $760,000 and during the active year of 1920 was $1,600,000. This latter sum amounts to $2,353 per mile of track.

WELDING JOINTS

The program of the company for 1921 provides for the welding of from 20,000 to 30,000 joints. As in 1920, thermit welding will be used on all new 9-in. and 7-in. girder rails and arc welding on 9-in. and on 60-lb., 70-lb. and 75-lb. T-rails where the lines are to be overhauled and the joints are not beyond the repairing stage. Arc welding will also be used on new and relaying 60-lb. and 75-lb. T-rails. This means that much arc welding will be employed.

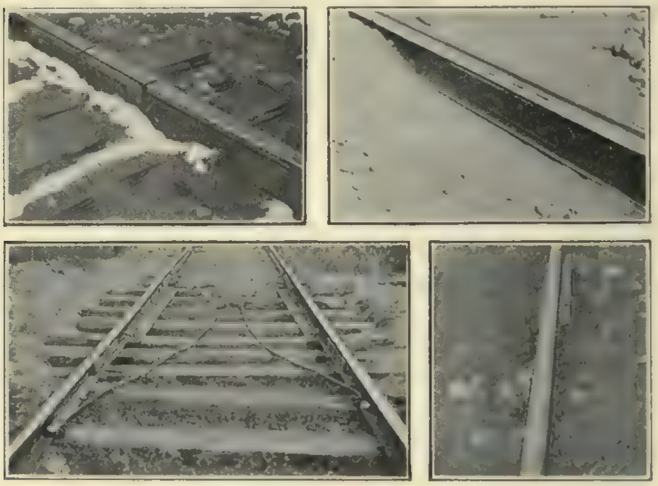
Where old track is being rehabilitated and the angle plates are badly worn the process followed is to put on new plates, if any are available, many sections being obsolete, or to put the old plates on upside down. The bolts are then tightened and if the point is low the ends of the rails are bent up about ¼ in. to ½ in. above the level. The bolts are then again tightened and the plates are then seam-welded in position. If the angle plates have been reversed the flange of the one on the inside of the track is then cut off with a torch. No effort is made to cut off the flange on the outside of the track. With a 9-in. girder rail, where it is difficult to get at the top of the plate underneath the tram of the rail, slots are cut in the tram with an acetylene torch to provide access to the top of the plate for welding. An accompanying photograph shows a 75-lb. T-rail with reverse angle plate welded, one side cut off and the other side not cut off. A second photograph shows a 9-in. girder rail with the slots mentioned cut in the tram.

Up to the present the company has been doing its arc welding with a carbon pencil with the rail as the positive pole, the theory being that no carbon can be drawn into the rail by the passage of the current. The company will experiment this year with a metallic pencil and with welds made in a variety of ways to determine which is best.

Practically all joints are now made by welding, even joints in exposed track. Where the track is entirely exposed expansion joints are put at the end of each curve and every 750 ft. on tangents. It is not expected, however, that these joints will relieve all stresses and strains in the track, as the extent to which the rails will slide over the ties and adjust themselves to expansion and contraction depends upon many causes, including the extent of corrosion between the spikehead and the base of the rail. About 4 miles of open track was welded by the Lorain process last year, and during the winter the breakages did not exceed 2 per cent. These breaks always occurred at the end of the angle or welding bar. An essential feature of the success of track welding consists in having the parts sand blasted or otherwise thoroughly cleaned just before welding. After the welding is done the joint is smoothed down by a grinder.

RAIL BENDERS

A brief description was given in the paper of Mr. Walker before the New England Street Railway Club on Dec. 2 of the home-made vertical rail benders used on the property. There are two types of these benders: One for 9-in. rail is made up of a 15-in. I-beam and one for T-rails up to 75 lb. made up of a 9-in. girder rail. A drawing of the former is shown. The bender of lighter design is very similar to the other except that it is made up of an old piece of 9-in. rail instead of a 15-in. I-beam. The drawing shows a yoke to go over the top of the bender and under the rail joint, though a chain for this purpose is sometimes used, as in the photograph accompanying Mr. Walker's paper in the issue of Dec. 2, 1920. The yokes are considered better, but trackmen sometimes mislay them and will then use anything handy, as a chain. The jacks used with these benders where a 9-in. 104-lb. girder rail is to be bent are of 30 tons capacity. For lighter rails jacks of less capacity are used.



REPAIRING TRACK IN MASSACHUSETTS

Typical break in arc-welded joint. Slots in tram head of 9-in. girder rail to facilitate joint welding. Expansion joint used with Lorain-welded joints on exposed track. Seam-welded plates reversed on 75-lb. rail.

The operation requires two men and the time taken is about ten minutes from the time that the jack and the bender are moved from one joint to the time they are ready to move to another. The general procedure is about as follows:

The ballast at the joint to be bent is opened up, after which any badly worn plates or bolts are replaced, then the bolts are pulled up tight. The yoke is then placed around the bottom of the plate at the center of the joint and the joint is raised from ¼ in. to ½ in. higher than the general rail surface, the height depending on the sag of the old bend at the joint. Before the jack is released the joint and adjacent ties are tamped.

With the length of bender illustrated it was found that the bending took place not only between the two bender supports but that the rail for several feet away from the bender support was raised. This was considered satisfactory as the deflection is usually 5 or 6 ft. back in each direction from the joint, although the extent of this deflection is not always apparent. Where the bend to be removed is very short an especially short bender is used. It was found also that the splice bars were bent up as well as the rails. Sometimes after these rebent joints had been under service for several days they sagged back, but in that case they were again set up.

Trackmen were instructed to see that the jacks had a firm position, because if they slipped out during the bending process the kick-back would be liable to hurt the men. The Eastern Massachusetts Company has had no injuries from this cause, but other roads have. The use of this rail bender ahead of the Lorain welder on badly surface bent 9-in. girder and light T-rail has also been found to help materially.

The rehabilitation work of the company during the past two years is based on the extended use on the system of one-man cars. In fact, the company is working rapidly toward 100 per cent one-man operation, and it is believed that a lighter track is possible than would otherwise be required. The abandonment by the company last year of freight service helps to make a light track adequate for the service operated.

Changes in Retail Prices of Food in the United States

THE retail food index issued by the United States Department of Labor through the Bureau of Labor Statistics shows that there was a decline of 1 per cent in the retail cost of food to the average family in March as compared with February.

Prices of forty-three food articles are reported to the Bureau of Labor Statistics each month by retail dealers in fifty-one important cities. From these prices average prices are made for each article. These average prices are then weighted according to the quantity of each article consumed in the average workingman's family. From January, 1913, to December, 1920, twenty-two articles of food were used in this index, but from January, 1921, forty-three articles are included in the index number.

For the year period March 15, 1920, to March 15, 1921, the percentage decrease in all articles of food combined was 22 per cent. For the eight-year period, March 15, 1913, to March 15, 1921, the percentage increase in all articles of food, combined, was 61 per cent.

The weighted index number of wholesale prices compiled by the department through the Bureau of Labor Statistics, and in computing which due allowance is made for the relative importance of the different commodities, stands at 162 for March, compared with 167 for February and 177 for January of the present year. The March figure is 36 per cent below that of March, 1920, and over 40 per cent below the high peak of last May. The base used in computing these index numbers is the average for the calendar year 1913.

New York Transit Reviewed*

The City Securities Which Were Issued for the Original Subway Are Shown to Have Been Self-Supporting Until Contracts for the New Lines Were Signed—Later Franchises Are Discussed — The Services of the New Commission Should Be Very Helpful

By HERMAN A. METZ
Former Comptroller City of New York

IN CONSIDERING the rapid transit question we have to go back to certain fundamentals and understand just what the city can do and cannot do in regard to its transportation question. I believe in home rule as much as any one, but sometimes the home rule principle falls down. The whole history of rapid transit legislation shows that the home rule principle was never considered to any great extent.

Under the original rapid transit act the Legislature created a commission consisting of seven members, five of them former presidents of the Chamber of Commerce of the State of New York, with the Mayor or Comptroller ex-officio members. This body was self-perpetuating. As vacancies occurred, other past-presidents of the Chamber of Commerce were nominated for membership. The city authorities; that is to say, the Board of Estimate, had the power to approve the routes laid out by this commission, pay them the salaries and vote the money for the building of the roads.

This was the commission that laid out the first subway, and after it had been authorized none of the people then interested in railroads in New York would even touch it. It remained for August Belmont to take a chance and equip and operate it under Contract No. 1, which specified that the operating company was to pay the interest and sinking fund on the city's investment of about $45,000,000, so that in reality this subway did not cost the city one cent and the bonds became self-sustaining the moment they were issued.

The contract turned out to be a good one for Mr. Belmont's company, and of course, as usual, agitators began to decry the profits the company was making and demand the abrogation of the contract and do all kinds of things to take it away from the Interborough. If it had been the other way and the Interborough had lost money, no doubt the same people would have chuckled with glee at the prospect of a corporation getting "stuck."

The old commission, however, was a very conservative one, and when the agitation arose for the Fourth Avenue Subway in Brooklyn it refused to sanction the route, although Mr. Belmont personally told me when I was Comptroller he would be willing to undertake the equipment and operation of the Fourth Avenue Subway clear to Coney Island on the same terms as Contract No. 1, and have it connect with the then existing subway for a 5-cent fare over the entire line. Conditions at the Brooklyn Bridge at that time, of course, were abominable and something had to be done. The Hughes-Hearst campaign for the governorship was on and the issue of municipal construction and operation became an important one. Mr. Hughes declared that if elected he would particularly see to it that the conditions on the Brooklyn Bridge were remedied and a new Rapid Transit Commission would be appointed which would handle the question of further facilities fearlessly and promptly. He was elected and redeemed his pledge by fathering the public service commission act and appointing the original Public Service Commission for the First District.

CITY DEMANDS MORE SUBWAYS

This commission immediately took up the Fourth Avenue Subway question, laid out a four-track route, but changed the original route from connecting with the then existing subway to one terminating at the Bowery and Canal Street over the Manhattan Bridge. I took the stand at that time, as Comptroller, when the contract for the first four sections amounting to $18,500,000 was to be approved, that the borrowing capacity of the city did not allow the certification of those contracts. But despite the question of the debt limit or the cost, and the fact that we were building only part of a subway, the final cost of which we had no knowledge, public clamor was so great that the Board of Estimate, as then constituted, would have approved the route and voted the money for the first six sections if I had not enjoined them by court action in a taxpayer's suit to ascertain what the debt limit was.

Under our Constitution New York can issue bonds only up to 10 per cent of the assessed value of its taxable property. This means, of course, that none of the property belonging to the city, state or the federal government can be taxed or assessed for tax purposes, neither can churches, hospitals or charitable institutions be taxed. It was customary whenever the city reached its margin or thereabouts to raise the assessed valuation of property, thus enlarging the borrowing capacity, and religiously see to it that every dollar of such increased margin was appropriated and disposed of within the year.

The courts sustained my contention as to what constituted municipal debt, my chief point having been that authorizations for improvements which had been voted should be considered in ascertaining the borrowing margin. At the time I brought the suit the city of New York had more than one hundred million dollars in authorizations outstanding, every dollar of which could have become debt the moment the borough president or heads of departments for whom the authorizations had been made should advertise and sign the contracts. Up to that time, however, these authorizations had never been considered, and the fact that they were outstanding was a menace which might at any time seriously involve the legality of bonds issued to pay the cost of such improvements.

SELF-SUPPORTING SUBWAY BONDS EXEMPTED

We had exempted from the debt margin bonds issued for water supply, and we had in 1907 and 1908 $45,000,000 of corporate stock (or city bonds) outstanding for the then existing subways, which were then self-sustaining. We also had about $50,000,000 worth of corporate stock outstanding for docks, which were more than earning the interest and sinking fund upon them. I sent a bill to Albany at the time allowing the city to exempt from its debt margin self-supporting bonds issued for subways or docks, expecting in this way to have released for further construction of subways $45,000,000 and for docks about $50,000,000. When the bill came back from Albany approved, it stipulated that the money could be used for docks and subways, with the result that eventually most of it was used for subways.

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*Abstract of address presented to New York Electrical League, New York, April 13, 1921.

Up to that time, while not openly a political matter, politics was played by the Public Service Commission against the Board of Estimate, and during the existence of the injunction not a thing was done by the Public Service Commission so far as bringing anything else but the Fourth Avenue Subway forward, although the increase in assessed valuations had raised our borrowing capacity sufficiently to do work in other directions.

DUAL SUBWAY PLAN AUTHORIZED

In the following election Mayor Gaynor and a fusion Board of Estimate, composed of Messrs. Mitchell, Prendergast and McAneny, were elected on a platform providing for municipal construction and operation of subways and attacks upon the then existing traction companies, the I. R. T. and the B. R. T. But during the life of that board the dual subway contracts were authorized and put into force by which the B. R. T. secured the operation of the Fourth Avenue Subway and extension of that subway up Broadway and into Queens, and the Interborough extension, out to East New York through Eastern Parkway, and the Bronx extension on Jerome Avenue and White Plains Avenue to the Mount Vernon line. Under the terms of these contracts, instead of carrying the interest and sinking fund charges, the companies were relieved of those expenses until they themselves earned a specified return upon their investment, and the city contributed what it had previously received from the Interborough as a preferential toward such earnings. In other words, the city has not since then received one cent, either for interest or for sinking fund, upon the $250,000,000 now invested in the subway system, and will not receive one cent until the companies receive the return provided for in the contracts upon their own invested private capital. Apparently that condition will never arise under contracts with which matters have been complicated.

We, as taxpayers, therefore, are paying into the budget every year for the debt service the amount of interest and sinking fund which should be paid by those using the subway. Our debt service today amounts to about $70,000,000 per year, and although the Constitution provides that the taxes for budgetary purposes; that is, the running expenses of the city, shall not exceed 2 per cent, the debt service is outside of that 2 per cent and may go on rising year after year. We are now on an average rate of 2.80 per cent for the various boroughs for this year, and the Board of Estimate was compelled to cut out of its estimates about $25,000,000 from the Board of Education allotment to keep within the constitutional 2 per cent limit.

In the meantime a 5-cent fare all over the city sounds good, but even with the dual system a passenger has to pay two fares if he goes from South Brooklyn above Forty-second or Fifty-seventh Street in Manhattan, and if by any chance he wants to go across town anywhere in any of the boroughs and needs to take more than one subway or trolley line he has to pay 5 cents each time he gets on a car or even into one of the Hylan buses. A 5-cent fare is a good thing if there is something to ride on, but where the trolley lines have stopped the public is walking.

During Governor Smith's administration attacks were made upon the Public Service Commission, with the result that the law was again changed and we had a double-headed body consisting of the Public Service Commissioner and the Transit Construction Commissioner, with the Board of Estimate having authority to pass upon routes and vote or deny the necessary funds, but with no power to do anything except make faces at the transit company or the receivers, who in the meantime had been appointed by the courts. Something had to be done to lodge authority somewhere to change the situation. The Board of Estimate takes the stand that if the companies cannot run for 5 cents they should lie down and the city will run the subways. Possibly the subways could be run for 5 cents and at a profit, but if everything else in town stopped, and the subways are now saturated to the limit during all hours, how and where would people find transportation facilities?

FACTS NECESSARY BEFORE SOLUTION IS POSSIBLE

The only way to solve the problem is to come to a showdown as to just what conditions are and what the cost of operation really amounts to, and the new law creates a commission with power to find out. Undoubtedly the railroad companies have been guilty of all kinds of high finance, and franchises obtained from the city for little or nothing have been manipulated and sold and watered stock issued against them, and leases and contracts with defunct companies are no doubt carried as assets and interest upon them is being charged against operating expenses. These should be wiped out. A franchise on which nothing can be earned is of no value, and bonds issued against such franchises are worth nothing at the present time, and this commission can find out how many such there are.

On the other hand, there is some real money in these corporations, and whatever value their stock has, be it ever so small, should and must be protected and cannot be wiped out entirely by a policy of confiscation. With a clean slate and the real value of properties ascertained, it may well be possible that a method can be evolved by which a 5-cent fare can be maintained and a profit made. But whether this is so or not, the people of New York will be entirely willing to pay for what they get, if they know what it costs, and if as taxpayers we are going to pay for the shortages, we ought to do it as a budget charge and not out of the debt service. This is simply a subterfuge which enables us to exceed the 2 per cent limitation for budget purposes.

The new commission has the power to ascertain the facts necessary for a basis on which to settle the question in the interest of all concerned, and to take the problem out of politics, so that future municipal elections at least will not be influenced by a feeling for or against public corporations, which are and must continue to be under State supervision and control. Until the bonds now outstanding become self-supporting and can carry themselves, the city will not have the means to take over existing transit lines or materially to extend present city-owned subways, and private capital will not unless guaranteed a safe and fair return. Unless, therefore, some means of carrying out either one or the other of these two alternatives is found, stagnation will continue and chaos result.

Turbine Oil Purification

The Continuous Filtration System, Which Retains the Original Lubricating Value of the Oil Almost Indefinitely, Has Practically Superseded Other Purification Methods

IN A RECENT article* Charles H. Bromley enumerates the severe conditions in steam turbine bearings that had to be contended with in the realization of a satisfactory system of lubrication. No satisfactory lubricant has been found which will not deteriorate under continuous use without purification. However, the problem of continuously maintaining the lubricating oil in first-class condition is limited principally to keeping it clean and dissipating the heat which it absorbs. The temperature of the oil in turbine bearings sometimes reaches 180 deg. Fahr., but the normal operating temperature is about 130 deg. This high operating temperature does not present any particular difficulty, for it is merely a matter either of increasing the rate of circulation or of installing more capacity in cooling coils.

On the other hand the problem of keeping the oil clean is most difficult, but its solution eliminates one of the most vulnerable features of turbine operation. One of the troubles encountered in an oil circulating system is that the rapid circulation of from seven to forty times per hour does not give the oil an opportunity to precipitate any moisture or foreign matter picked up in its circulation, nor does it permit the elimination of air or moisture which may have found its way into the oil.

The combination of water, air and heat and the rapid circulation of oil cause it to oxidize and readily form an emulsion, in which a brownish or light chocolate colored sediment is produced. Most of this remains in suspension in the oil if not continuously removed. Emulsion increases at an accelerated rate once a small amount has accumulated. If the oil receives no treatment at all, after a certain time its lubricating qualities disappear entirely. By adding "make-up" oil or "sweetening" oil, this period is only slightly increased, since the impurities, emulsions, sludge, etc., are not removed, but merely diluted.

The "batch" system is an improvement over those already mentioned, for the entire oil charge of the lubricating system is drained at definite intervals and if necessary a fresh supply of clean oil is introduced. The used oil is submitted to a filtration and purification process in which heating of the oil to a high temperature, precipitation and chemical treatments must be resorted to. Since the oil is renovated after it has reached a predetermined state of deterioration by draining the entire system, it becomes necessary to shut down the turbine units each time the oil is changed.

The continuous filtration system, which is almost universally used now, depends for its effectiveness upon continuously removing the moisture and other impurities which cause emulsification and sludge and deteriorate the lubricating value of the oil. Emulsion cannot take place if the impurities which cause it are removed as fast as they occur and will not form as the emulsion builds up.

In this system the oil leaving the bearings is filtered before it is returned to the turbine oil reservoir and is most positive and effective in maintaining the quality of the oil. Due to the small loss, oil of the very highest grade and type can be used economically. The oil becomes an investment rather than an expense.

The continuous by-pass system is extremely simple. It consists of a gravity oil filter and an oil pump. With proper oil and a clean circulating system there is no deterioration of the oil, because the circulation is so rapid keeping impurities in suspension; purification of the whole oil charge is so frequent that no sludge or muck accumulate, all the oil in the system passing through the filter every hour.

The process of purification is accomplished both by precipitation and filtration through closely woven cloth. By the former process oil is brought practically to rest and entrained water and heavy particles of foreign matter are allowed to settle out. The remaining impurities are then removed as the oil passes through the cloth filtering elements.

Train Operation in Kansas City

Kansas City Railways Is Experimenting with a Multiple-Unit Train Having Several Features Contributing to a Quick-Loading Scheme as a Rush-Hour Service Adjunct

WITH the idea in mind of being able to move rapidly a large number of people during the peak-load hours, provided ample provisions were made for quick loading, the officials of the Kansas City (Mo.) Railways have equipped experimentally a two-car train with multiple-unit control and other interesting features. To try out the experiment two old cars which had formerly been equipped with type M control were connected together with a control jumper and bus-line jumper so that the train could be operated with one trolley. Doors were installed on the front and rear platforms of both cars and arranged for air operation. The rear doors were arranged so that they could be opened from the street by a street collector. The platforms of these cars were rather short and consequently it was impossible to make the doors as wide as was desired, but by constructing them with two panels and by various experimenting they were made fairly satisfactory.

An arrangement was also worked out whereby the brakes are released as the doors close. A buzzer system whereby the conductor on the rear car can signal the crew on the first car was installed, the buttons for passengers not being connected through between the two cars. The compressors on the two cars were tied together electrically so that both start simultaneously whenever either governor cuts in. This arrangement was made in order to keep both compressors working if the adjustments of the governors were different.

Some difficulty was at first experienced in securing the proper operation of the electric switches located at numerous points over the system. This difficulty developed from the fact that both cars were taking energy from one trolley, so that the added load of the compressor, heaters and lights of the second car caused the switches to take the power-on position when the controller was in the off position. This was overcome by placing the heater switch for one car where the motorman could cut out the heaters when operating the electric switches.

The train has been operated with a crew of three men, a motorman and conductor on the first car and a conductor on the front end of the rear car. When the train passes through the congested district in the

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*See *General Electric Review*, May, 1921. Mr. Bromley was formerly a member of the editorial staff of *Power*.

rush hour a street collector opens the rear door of the rear car from the street and collects fares from passengers boarding there. An additional street collector takes his position at the front door of the front car, so that the train is loaded through four doors at the same time. A further development in this connection, looking toward better efficiency, is contemplated.

This train has now been in operation for a number of weeks, with the result that it is felt that the idea is practical and capable of development. In speaking of this experiment Henry S. Day, equipment engineer, said: "We are taking our time in studying the operation of this train, and if we decide eventually to equip a number of trains for this service we shall equip them with a modern type of multiple-unit control and further develop the idea of rapid loading, which is, of course, absolutely necessary when a unit of this type is to be run on a line with single cars. We are now operating this equipment in the manner indicated and running on time, and I believe we can very much improve a good many features of the train as it now stands."

If the plan is carried out the multiple-unit control will probably be installed on some of the heavier types of cars owned by the company, which are not now run except in the rush hours. These cars can be utilized for rush-hour service and permitted to stand idle during the remainder of the day satisfactorily, for operation of these heavy cars during light-loading periods is of course very uneconomical, particularly in Kansas City, where there are many grades, some excessive, on all of the lines.

To Honor British Engineers

THE organized engineers of America will send a mission to London this summer to express the obligation which the world owes to the engineers of Great Britain for the part they played in winning the war. This mission, consisting of nationally known engineers and representing the so-called Founder Societies, will also make the award of the John Fritz medal to Sir Robert Hadfield at the opening meeting of the British Institution of Civil Engineers on June 29. The inability of Sir Robert to come to the United States to receive the medal moved the trustees of the John Fritz Medal Board of Award to make the ceremony of presentation in England the occasion for an international expression of appreciation by the engineers of the United States to the engineers of Great Britain.

The deputation to England will consist of Charles T. Main of Boston, representing the American Society of Civil Engineers; Colonel Arthur F. Dwight of New York, the American Institute of Mining and Metallurgical Engineers; Ambrose Swasey of Cleveland, the Joint Fritz Medal Board of Award and the American Society of Mechanical Engineers, and Dr. F. B. Jewett of New York, the American Institute of Electrical Engineers. Dr. Ira M. Hollis, president Worcester Polytechnic Institute and past-president American Society of Mechanical Engineers, will accompany the deputation and bear the message from the American engineers.

The adjustable seats for motormen on the Berlin street railways are fitted with an arm attached to the main support of the seat and about one-third of the way down. This arm passes between the legs of the motorman at about the height of his knees and helps to steady the seat when it is in use.

Two Years of Service

How the Illinois Committee on Public Utility Information Has Helped the Utilities of that State—Its Help Sought from All Parts of Country

THE Illinois Committee on Public Utility Information is two years old this month. It celebrates its second anniversary by passing the 5,000,000 mark in pieces of literature distributed. Its work has been so successful that similar bodies have been organized in nine other states—Indiana, Kentucky, Ohio, Nebraska, Missouri, Oklahoma, Arkansas, Wisconsin and Michigan—and its help is constantly sought, from all parts of the country, by newspapers wanting data pertinent to current news, by high school and college students facing a debate or a thesis, by lecturers wanting to freshen up platform material, by writers of circular, publicity and advertising matter for investment houses and so on.

Samuel Insull of the Commonwealth Edison Company is largely responsible for the organization of the committee. He conceived the general scheme and with the co-operation of both Bell and independent telephone interests the original membership of the committee in April, 1919, came to be as follows: John F. Gilchrist, vice-president Commonwealth Edison Company, chairman; Martin J. Insull, vice-president Middle West Utilities Company; Charles A. Munroe, vice-president Public Service Company of Northern Illinois and People's Gas Light & Coke Company (now president of American Gas Association); Britton I. Budd, president Chicago Elevated Railways; Bernard J. Mullaney, manager Public Relations Department, People's Gas Light & Coke Company; Clifford Arrick, publicity manager Chicago (now Illinois Bell) Telephone Company; W. S. Vivian, secretary-treasurer United States Independent Telephone Association.

The result is practically every electric, gas, electric railway and telephone company in the state is now co-operating and is represented on the (enlarged) committee through members designated by the state electric, gas, electric railway and telephone associations. The committee's work was organized and is still guided by Mr. Mullaney as director and H. M. Lytle, former financial editor of the Chicago *Record-Herald*, as associate director.

Out of the experience of all concerned in this Illinois campaign have come certain definite conclusions in relation to work of this character, among them the following:

Two important factors in the committee's success have been: (1) The careful way in which its work is done so that no accusation may lie against it of trying to mislead the public, and (2) the motive power supplied by the weekly meetings of the committee and the facilities of the committee members for getting close to local managers and spurring them to co-operative action.

This proximity and local contact are essentials usually lacking in educational campaigns of national scope, when directed from one central point. The Red Cross, the Liberty Loan, the Salvation Army and other war organizations found they could not get publicity results by operating nationally; they had to organize regionally by states and by communities. The Illinois plan establishes this local contact and, when adopted in every state, provides the machinery for giving national scope and effect to any kind of utility campaign, whether general or special.

ELECTRIC RAILWAY PUBLICITY

Devoted to How to Tell the Story

Safety Car Boosting in Los Angeles

An Illuminated Map Is Used in Conjunction with a Chart to Show the Development of Safety Car Operation Throughout the United States

ILLUSTRATING the number of safety cars in the United States and the growth in orders from 1915 to 1920, an illuminated map, which was exhibited by the Westinghouse Electric & Manufacturing Company at the Atlantic City convention of the American Electric Railway Association, is being displayed by the Los Angeles (Cal.) Railway. The map has been mounted in the lobby of the main offices and has attracted widespread attention.

The map measures 7 ft. x 11 ft. and shows every city that operates safety cars. With the map is a chart showing the curve of orders from two cars in 1915 to 2,100 in 1920, with a total of approximately 4,400. As the first lights appear on the chart, corresponding lights appear on the map showing the cities in which the early deliveries were made. This scheme of corresponding lights on the chart and the map continues until the entire map is illuminated.

The number of safety cars in each city is indicated by the color of the light. A white light shows fewer than twenty-five safety cars; blue from twenty-five to forty-nine; green, from forty-nine to ninety-nine, and red for more than 100.

The significance of the map is explained by cards attached to it, and pictures of safety cars in operation on Los Angeles streets have been placed with the exhibit.

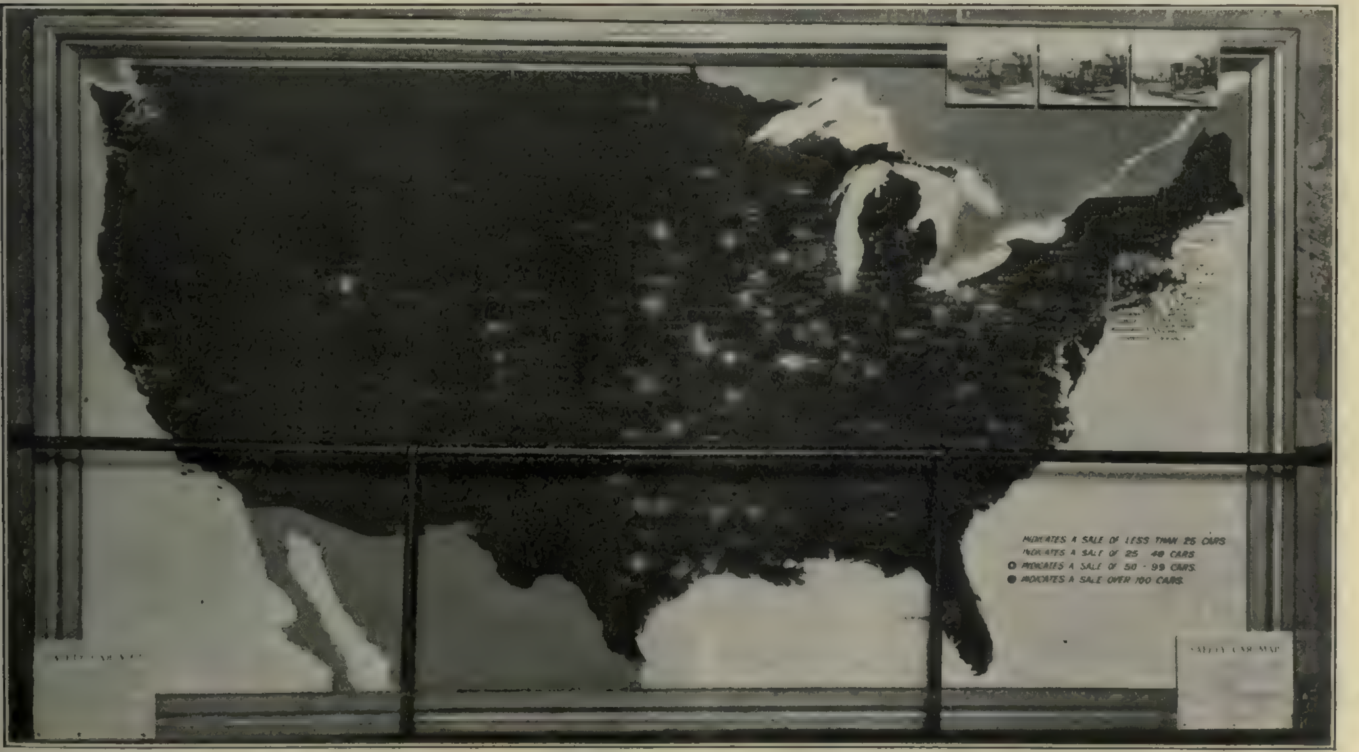
Cards in all street cars advertise the map and invite those interested in street car service to inspect the exhibit. Newspaper publicity and advertising have been utilized, particularly in community papers of the districts served by safety cars.

The exhibit was used in connection with the establishment of safety car service on two lines of the Los Angeles Railway running through the downtown district. Following the display of the map in the main offices, it is planned to place it in a store window in the main part of the city.

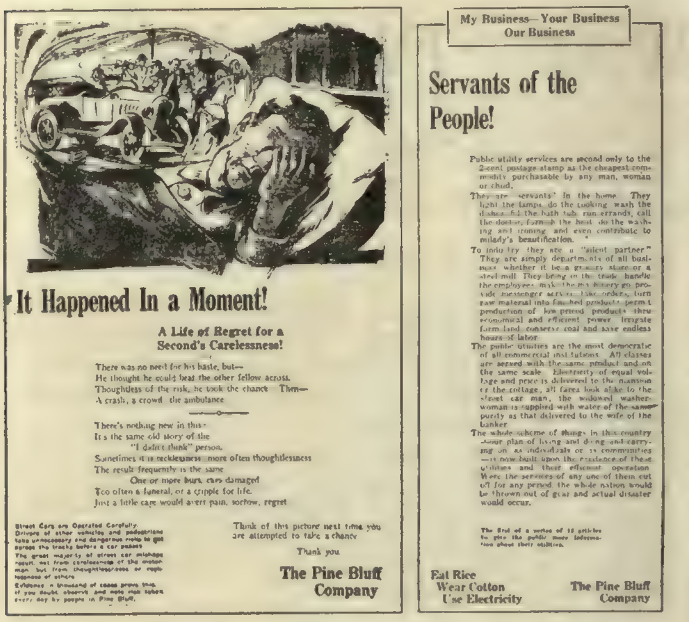
A Campaign of Instruction

THE Pine Bluff (Ark.) Company recently undertook a campaign to give the public more information about the utilities. A method was employed similar to that effectively used in the Doherty thrift campaign. The series was made up of fourteen articles, which appeared at more or less regular intervals in the local newspaper.

The aim of this publicity was merely to get the people thinking about the utilities. The first one told how dependent a community is upon the existence of the utilities and their efficient operation. The second said that the community's biggest single investment is in its utilities and that in Arkansas they pay more than one-fifth of all the state taxes. In another the fact was


INDICATES A SALE OF LESS THAN 25 CARS
INDICATES A SALE OF 25 49 CARS
○ INDICATES A SALE OF 50 - 99 CARS
● INDICATES A SALE OVER 100 CARS
SAFETY CAR MAP

ILLUMINATED KEY MAP AND CHART SHOWING THE GROWTH OF SAFETY CAR SERVICE



It Happened In a Moment!

A Life of Regret for a Second's Carelessness!

There was no need for his haste, but—
He thought he could beat the other fellow across.
Thoughtless of the risk, he took the chance. Then—
A crash, a crowd, the ambulance.

There's nothing new in this—
It's the same old story of the
"I didn't think" person.
Sometimes it is recklessness, more often thoughtlessness.
The result frequently is the same.
One or more hurt, cars damaged.
Too often a funeral, or a cripple for life.
Just a little care would avert pain, sorrow, regret.

Street Cars are Operated Carefully. Drivers of other vehicles and pedestrians take unnecessary and dangerous risks to get across the tracks before a car passes. The great majority of street car mishaps result, not from carelessness of the motormen, but from thoughtlessness or recklessness of others. Evidence—a thousand of cases prove this. If you doubt, observe and note risk taken every day by people in Pine Bluff.

Think of this picture next time you are attempted to take a chance.

Thank you.

The Pine Bluff Company

My Business—Your Business
Our Business

Servants of the People!

Public utility services are second only to the 2-cent postage stamp as the cheapest commodity purchasable by any man, woman or child.

They are "servants" in the home. They light the lamps, do the cooking, wash the dishes, fill the bath tub, run errands, call the doctor, furnish the heat, do the washing and ironing, and even contribute to milady's beautification.

To industry they are a "silent partner." They are simply departments of all business, whether it be a grocery store or a steel mill. They bring in the trade, handle the employees, make the machinery go, provide messenger service, take orders, turn raw material into finished products, permit production of low priced products thru economical and efficient power, irrigate farm land, conserve coal and save endless hours of labor.

The public utilities are the most democratic of all commercial institutions. All classes are served with the same product and on the same scale. Electricity of equal voltage and price is delivered to the mansion or the cottage, all fares look alike to the street car man, the widowed washerwoman is supplied with water of the same purity as that delivered to the wife of the banker.

The whole scheme of things in this country—our plan of living and doing and carrying on as individuals or as communities—is now built upon the existence of these utilities and their efficient operation. Were the services of any one of them cut off for any period, the whole nation would be thrown out of gear and actual disaster would occur.

The first of a series of 15 articles to give the public more information about their utilities.

Eat Rice
Wear Cotton
Use Electricity

The Pine Bluff Company

AT LEFT, AN ADVERTISEMENT IMPRESSING THE RESULT OF CARELESSNESS. AT RIGHT, THE FIRST ARTICLE OF THE SERIES GIVING INFORMATION ABOUT THE UTILITIES

brought out that every community is known and judged by its utilities; that where the service of utilities is not efficient, experience warrants the deduction that some influence is at work which threatens the desirability of that community as a place of residence and occupation, making it a good place in which not to invest money—a good place to stay away from. Thus, in the series of articles the facts are laid before the public in an unbiased and matter-of-fact way.

Besides this educational campaign the Pine Bluff Company has tried to promote the safety movement by the insertion in the newspapers of advertisements which bring home to the reader the penalty of carelessness and thoughtlessness. One that appeared recently is reproduced herewith.

Courtesy an Essential of Service

THE courtesy of employees on the properties managed by Britton I. Budd, the Chicago Elevated Railways, the Chicago, North Shore & Milwaukee Railroad and the Chicago & Interurban Traction Company, has frequently been the cause of complimentary comment on the part of patrons. This is particularly true of the trainmen on the North Shore Line, a fact that has undoubtedly contributed materially to the great growth in the passenger business of this high-speed interurban.

A recent letter sent out to all employees by Mr. Budd is an example of how the employees are impressed with the importance and essentiality of courtesy in dealing with the public.

The letter follows:

> It has been the established principle of the elevated lines for many years that the employees must be courteous, considerate and kindly in all of their dealings with the public. The majority of the employees have become noted and are often commended for these qualities. There are some few, however, who are an exception to the rule and there are others who do not make the effort which they should. Little attentions and courtesies make your day's work easier, cost nothing and are essential to maintaining the good opinion of the public.
>
> You are all salesmen and saleswomen, selling the only product the company has, which is transportation. If you patronize stores where you are gruffly treated or where your patronage is not welcome and you do not receive proper attention, even if it might not be termed discourteous, you transfer your patronage elsewhere. Transportation on any particular line is not compulsory and people will go where they are treated with the most consideration and obtain the best service. The attitude of the employees is one of the biggest elements in the word "service." Service performed by employees which in their relations with passengers may not be required of them very frequently offsets some inconvenience a passenger may have met.
>
> The public is well aware that the increase in fares is largely, if not wholly, due to the increase in wages which you have received. In other words, passengers are paying you your increased wages, and when they meet with discourtesy, indifference and lack of consideration, it is perfectly natural that they should resent it.
>
> Hereafter, any employee coming in contact with the public as a representative of the company, who is discourteous, indifferent or incapable of reflecting the spirit which actuates a majority of the employees, will be considered a detriment to the interests of both the employees and the company, and his or her services with the company will be dispensed with.

Lady, Lady, Shopping

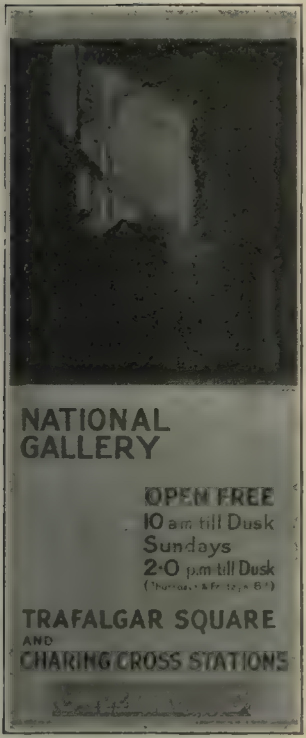
(5:30 P. M. in the Evening)

LADY, Lady, shopping—
Rather late you're stopping!
Can't you get your shopping done
Till the evening's well begun?

Lady, Lady, hunting
Half a yard of bunting—
Can't you search that bargain store
'Twixt the hours of ten and four?

More of London's Merchandising Picture Talks

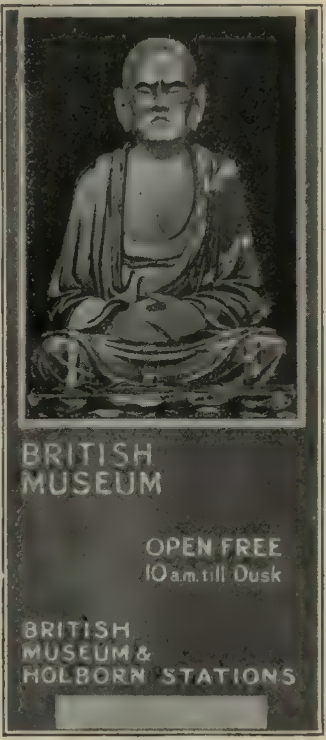
Attractive Colored Posters Used to Advertise Points of Interest Reached

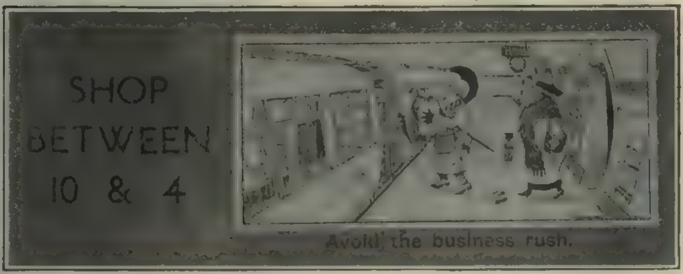


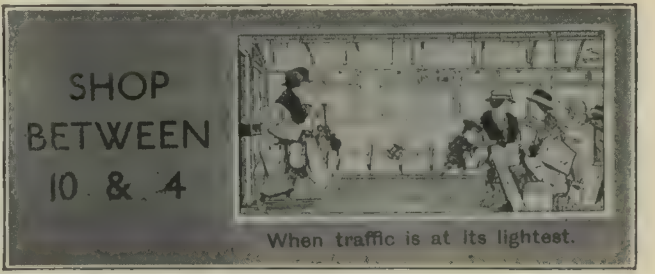
FEW ELECTRIC or steam railroads in this country carry out the transportation merchandising plan of the London Underground System. The accompanying illustrations show miniatures of some of the posters that have recently been put out to develop new traffic and to spread out the existing traffic on its lines. Some of these posters are intended for display in the stations on billboards, while those urging patrons to shop outside the rush hours are for display in the cars.

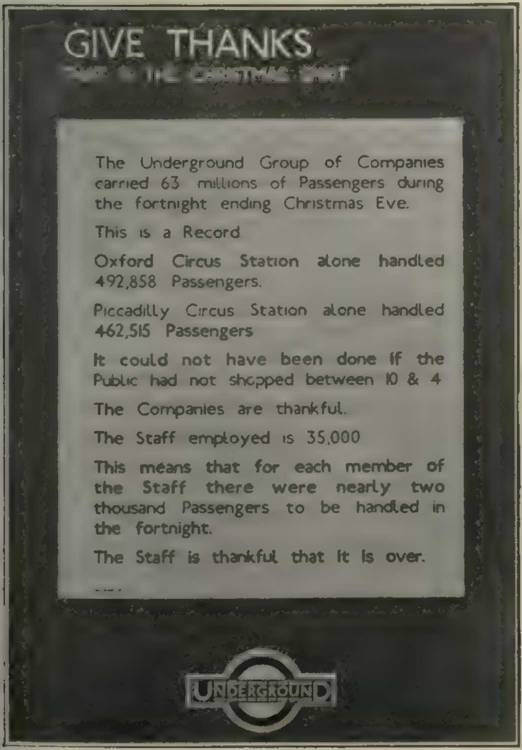
The merchandising idea of selling service is portrayed in these posters in a variety of effective appeals. Take, for instance, the zoo poster with its animal border. This creates an immediate desire to see them alive—hence a ride. The same can be said of the museum posters.

The ideas in the poster "Give Thanks" undoubtedly express the feelings of many a manager and operating man after a period of heavy traffic—but unfortunately very few if any have taken it upon themselves to capitalize the favorable feeling that the public has toward them after such a period. What a chance they have lost to hold the graces of their patrons! Traffic managers that take these ideas and apply them to local points of interest will not only be selling their own product but will be boosting the community served.






SHOP
BETWEEN
10 & 4
When traffic is at its lightest.


GIVE THANKS

The Underground Group of Companies carried 63 millions of Passengers during the fortnight ending Christmas Eve.

This is a Record

Oxford Circus Station alone handled 492,858 Passengers.

Piccadilly Circus Station alone handled 462,515 Passengers

It could not have been done if the Public had not shopped between 10 & 4

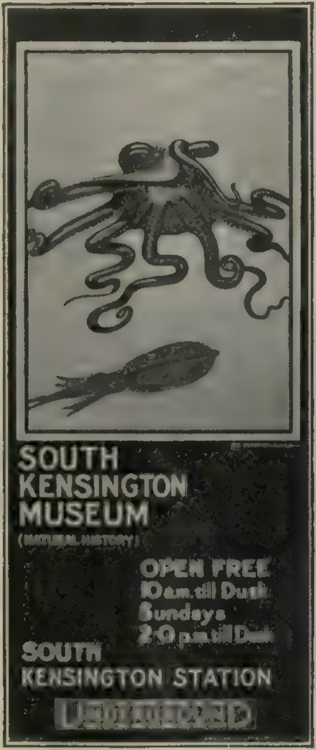
The Companies are thankful.

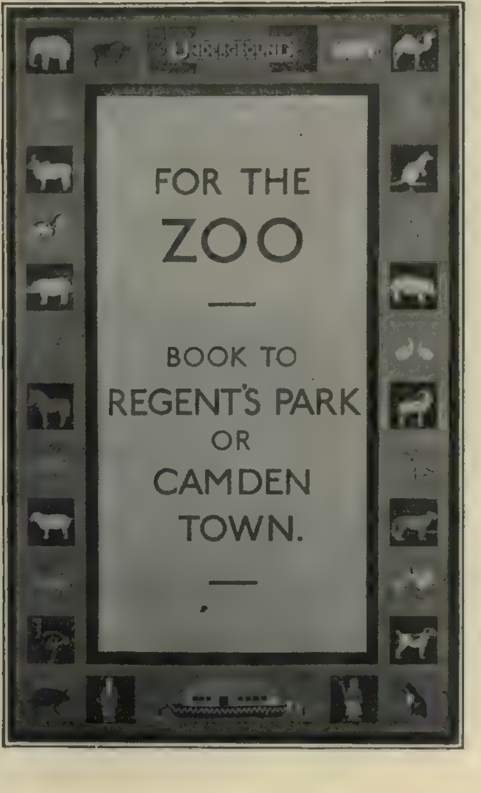
The Staff employed is 35,000

This means that for each member of the Staff there were nearly two thousand Passengers to be handled in the fortnight.

The Staff is thankful that it is over.

UNDERGROUND



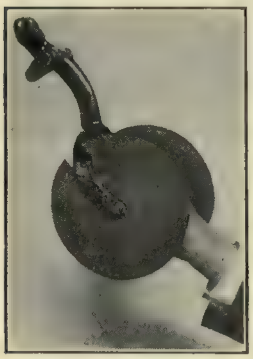


New Line of Switchboard Instruments

SWITCHBOARD VOLTMETER

THE Westinghouse Electric & Manufacturing Company has just placed upon the market a new line of ammeters and voltmeters for switchboard use. These instruments operate on the D'Arsonval principle and the movement, complete with the core and pole pieces assembled, can be removed as a unit, thus facilitating inspection and repairs. These instruments are designated as type SX and are finished in a dull black marine. The overall dimensions are $7\frac{7}{16}$ in. in diameter and $2\frac{13}{32}$ in. deep. The weight of each instrument is 9 lb.

Making Breaker Arms Safe



SAFETY DEVICE FOR BREAKER ARM

TO PREVENT an operator from coming in contact with the metal part of a breaker arm while taking hold of the handle, J. O. Penisten, superintendent of power distribution of the Union Traction Company of Indiana, has developed the safety device shown herewith. It consists of two large insulating disks placed at the sides of the handhold on the alternating-current circuit breaker arms of substation switchboards. As ordinarily constructed, the operator is quite liable to slide his hand over so as to come in contact with the metal arm while some part of his body is in contact with a ground. The use of these insulating disks makes it impossible for the operator to touch the metal arm of the breaker in its ordinary operation.

A Balanced Folding Car Step

A SCHEME for hanging folding steps has been devised by C. R. McMahon, master mechanic Des Moines (Iowa) City Railway, which materially lightens the labor involved in operating the step and door mechanism. The scheme consists simply of mounting the step so that the axis or hinge point is about one-third of the way out on the step board, instead of being at the inner edge of the step as is usually the case. This one-third of the step on the inside of the hanger acts as a counterbalance against the other two-thirds as the step is raised. In other words, instead of having to pull up the weight of a step 12 in. wide, the operator has only to lift the weight of an 8-in. width step, counterbalanced by the other 4 in. The step mounting is shown in an accompanying picture.

COUNTER-BALANCED STEP MOUNTING USED IN DES MOINES

Pneumatic Seat for Motormen

THE accompanying illustrations show a new type of pneumatic seat which has been in use on two cars of the San Francisco, Napa & Calistoga Railway during the past three months. It has proved so satisfactory that the company is now installing this device on the remaining cars of the system. It is the design of Henry Seibel of San Francisco.

In the construction of the seat an air cushion takes the place of steel springs, which are sometimes used, and absorbs the vibration. This air cushion consists of an inner tube, an outer flexible casing and a deformer. Both the inner tube and the outer flexible casing are made of rubber. The inner tube is in one piece, the upper part being inclosed in a rigid casing, while the lower end fits into the flexible casing. A check valve is inclosed in the inner tube to facilitate its being filled with air. As now used the seat is attached to a short-legged stool.

NEW TYPE PNEUMATIC SEAT FOR MOTORMAN

Saves Commutators

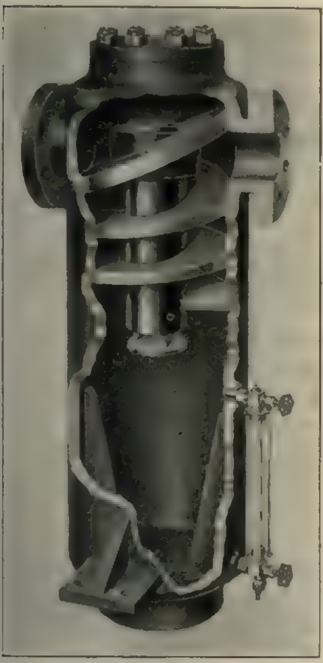
A NEW, easy and most economical means of keeping oil from working into the ends of commutators is now being used by the Pittsburgh (Pa.) Railways. After trying all the well-known methods of taping, wrapping with string, etc., a "dope" was evolved which does the work most efficiently and economically.

The "dope" is a mixture of equal parts of dextrine and plaster of paris to which is added enough shellac to make the preparation thin enough to apply with a brush.

After the mica and copper at the commutator's end are thoroughly cleaned, the "dope" is applied so that it completely covers the ends of the bars and the V-ring. After this has dried for twenty-four hours it is said to be thoroughly set and absolutely impervious to any oil which would otherwise get into the commutator. When the "dope" is put on an armature which is later dipped and baked the baking process strengthens it.

The Pittsburgh Railways says this new dope is saving money both in reduction in the number of armatures having oil in the commutator end and in the cost of trying to prevent oil from seeping in. The company is "doping" about twenty-five commutators a day. J. H. Klein is the foreman of the armature winding department, where this "dope" was evolved and is applied.

Improved Centrifugal Separator


CENTRIFUGAL SEPARATOR

THE accompanying illustration shows a redesign of the Stratton separator, which is being placed on the market by the Griscom-Russel Company, New York. In the redesign of this separator the helical path has been lengthened in order to increase the centrifugal separating action. The manufacturers claim that this feature, together with the spatter cap on the outlet pipe, greatly increases the separating efficiency. This type of separator is used for the removal of water from both steam and air systems.

Turning Car Wheels in Small Lathe

THE mechanical department of the Union Street Railway, New Bedford, Mass., has succeeded in adapting a 28-in. Manning, Maxwell & Moore lathe to the turning of all its steel car wheels which run as high as 33 in. in diameter exclusive of flanges. The company was formerly obliged to send all wheels outside for turning, the larger ones being sent to Philadelphia. This involved not only the outside charges but also freight bills and delays incident to shipping by freight. The 28-in. lathe which was already in the shop was rugged enough to handle this class of work if the diameter limitation could be overcome.

To increase the swing of the lathe three iron castings were secured and machined to fit the track on the lathe bed and were placed respectively under the headstock, tailstock and center-rest, raising the three working parts of the machine to an additional height of 4½ in., so that now the 28-in. lathe will swing a 37-in. diameter.

The wheels are not removed from the axle, the whole unit being placed in the lathe, after the rough hard surface of the wheels has been removed in the grinder to save wear on the lathe tools. A pair of dogs are attached to the faceplate at opposite sides of the center and bolted to the "near" wheel, giving a steady uniform drive free from vibration and preventing eccentricity in cutting which might result if the wheel were driven from one side only. These dogs were made by bending 1-in. x 5-in. wrought-iron bars into U-shaped fittings with lugs at the tips.

Perforating Ties to Insure Complete Impregnation

A MACHINE for perforating ties before impregnation has been developed and installed at the plant of the St. Helen Creosoting Company, St. Helen, Ore. It was designed and built by Greenlee Brothers & Company of Rockford, Ill. On page 560 of the ELECTRIC RAILWAY JOURNAL for March 19 was described a machine for puncturing the butts of poles before treatment which operated by dropping chisel-shaped bars on the pole. The perforating machine used for ties operates on a different principle. The ties are subjected on all sides to the rolling action of four toothed drums, two rotating on vertical axes and two on horizontal. The teeth are so spaced that incisions are made both across and along the grain and so that those along the longitudinal axis of the ties form diagonal lines. The diameter of all the drums is 14½ in. The speed of the machine is 70 lin.ft. per minute and it handles ties up to a maximum size of 8 x 14 in.

The lower horizontal drum and the right-hand vertical drum, looking in the direction in which the ties are fed into the machine, are located rigidly and both are driven by gearings mounted upon the side of the machine arranged to receive its power from a 15-hp. motor. The top horizontal drum and left-hand vertical drum are flexibly and adjustably mounted for variations in the tie sizes, and are furthermore provided with flexible connections which will permit of a rocking or tilting position for perforating ties of more or less irregular form. In addition to the four principal drums there is provided a counterweighted or spring-actuated pressure roll, power driven from the same motor and adjustably hinged in the front of the horizontal drum as an aid to the operator in lining up the ties against the rear fence as they are inserted in the machine, thus assuring a straight and true feed.

The two adjustably mounted drums are fitted with heavy coil springs, provided with tension adjustments arranged to give the necessary force to the drums for properly performing their perforating functions. The maximum pressure provided for in these springs amounts to 25,000 lb.

Each drum contains twenty-five toothways, arranged to carry the teeth for perforating at approximately 2-in. distances lengthwise on the timber. The teeth are placed in these toothways with spacing blocks for 1¼-in. tooth centers. The teeth are of hardened, tempered tool steel, designed to project ⅞ in. from the surface of the drum. The face of the drum is in contact with the ties as they are passed through the machine, so that the teeth penetrate into the wood the full length of their projection from the surface of the drum.

The development of this method makes it possible to treat the tie with a minimum reduction in its natural strength and durability, so that its maximum mechanical life can be obtained. Hitherto deep penetration of preservatives into the wood has been obtained only at a sacrifice of from 30 to 40 per cent of the natural strength of the wood, due to the continued subjection to the treatment at a high temperature. Under this process lower temperatures and less time for treatment are required, so that there is a reduction of not more than 8 to 10 per cent of the strength of the timber in compression perpendicular to the grain. Thus a reduction in the present loss in strength and mechanical life of treated perforated ties reaches the point where the cost of treatment is justified.

Letters to the Editors

Maintenance Cost on a Car-Weight Basis

NEW YORK, April 18, 1921.

To the Editors:

In connection with the article entitled "Why Alter the Standard Safety Car Design?" by J. C. Thirlwall, which was published in the April 16 issue of the ELECTRIC RAILWAY JOURNAL, I find the analysis of maintenance cost as affected by car weights particularly interesting. The basis for arriving at the relative values, however, is not quite clear to me. As I understand it, the author says that at least one-fourth of the cost for maintenance of way and structures and fully one-half the cost of equipment maintenance are affected by the weight and size of the car body. If you have data available that will illustrate these deductions, I should be interested in obtaining them. "ENGINEER."

[EDITORS' NOTE—The above question was referred to Mr. Thirlwall and he has furnished the reply given below.]

SCHENECTADY, N. Y., April 20, 1921.

To the Editors:

I do not suppose any two men in the country will agree on the actual effect of car weights on average equipment maintenance or track maintenance. I arrived at my figures by some such line of thought as this:

From figures I have seen it appears that of the total maintenance of way and structures about two-thirds is the actual maintenance of the roadway; that is, the money spent on renewals of rail, special trackwork and ties and in tamping up weak joints. It is of course obvious that a considerable part of the deterioration of rail and of ties is caused by weather conditions rather than the weight that passes over them, but on the other hand it is equally certain that a large part of rail wear and practically all cases of loose joints can be attributed to weight. It is also certain that, theoretically, tie spacing can be proportioned to the weight carried on any given size of rail, and many roads have taken advantage of this fact to space ties much wider apart since the introduction of lightweight city and interurban cars than they had previously done.

I, therefore, estimate that of the 65 per cent of the total which goes into track maintenance about 40 per cent is caused by weight, or approximately 25 per cent of the total.

On equipment maintenance, I figured brakeshoe and wheel wear is directly proportional to the weight carried, compressor maintenance is very nearly proportional, the gearing wear and motor bearing wear are directly dependent upon the weights moved. With any given size motor the heating increases roughly as the square of the weights handled, and, in the particular case I had in mind, we believe the maximum safe capacity of the motors has been reached with the present weight of the standard safety car and that any material increase will tend considerably to reduce the life of the motor insulation. In other words, while the 25-hp. motor can handle considerably greater weights provided the schedule speeds and number of stops are moderate, we feel that when stops run to nine or ten per mile and the maximum speed possible under these conditions is used, 16,000 lb. dead weight is about all that the motors should be called upon to handle. The heavier the car the greater becomes the burning of control fingers and of circuit breaker tips, two doors with their mechanisms obviously require more repairs than one, a greater area of body requires more paint Balancing all these points together and comparing with the relatively small proportion that are unaffected by the size and weight of the body leads me to believe that at least half of the total maintenance is affected by the body weight.

Of course, as I said before, I do not expect that all equipment engineers will agree with my estimates, but there are probably as many who will raise them as there are who will reduce them. J. C. THIRLWALL.

National Standardization Movement Deserves Support

PUBLIC SERVICE RAILWAY
CAMDEN, N. J., April 21, 1921.

To the Editors:

I note the editorial on the annual report of the American Engineering Standards Committee and the synopsis of the report, in the last issue of the ELECTRIC RAILWAY JOURNAL. As you know, the writer has been deeply interested in national standardization from the beginning of the movement, first as one of the representatives of the American Society of Civil Engineers and at present also as representative of the American Electric Railway Association on the American Engineering Standards Committee.

It seems particularly fitting that the A. E. S. C. has just at this time established itself on a substantial footing to "Americanize" our standards. There seems to be a general cognizance of the great possibilities for this work for savings of the nation's resources and industry. This is particularly apparent from the interest that is being shown by such important national bodies as the United States Chamber of Commerce, the American Association of Manufacturers and the Department of Commerce of the United States under the able leadership of Secretary Hoover. There is no doubt that a wider use of standards would stabilize both labor and capital to a great extent. Standardization would allow stocking up in dull times.

The executive committee of the American Electric Railway Association, at its last meeting, instructed all of the standing committees carefully to go over the Engineering Manual and pick out all standards that in their judgment should be submitted to the A. E. S. C. for approval. These reports will be submitted to the standards committee of the American Electric Railway Engineering Association and if approved by the executive committee will be submitted with all pertinent facts to the A. E. S. C.

One thing the American Electric Railway Engineering Association has been trying to do in the past has been to induce a wider use of the standards that it now has and that have cost the association so much time and labor. Although it is almost a crime, in these days when we are trying to increase production at a reduced price, to change a recognized standard just for some personal whim, it is not uncommon for those who have authority to this end actually to do this very thing. Those who have carried on this expensive practice in the past without proper regard to the association stamp of approval will not be so prone to do so if the particular association standard has been "Americanized" by the A. E. S. C. Besides, the manufacturers or selling companies would be in a better position to take exception to proposed changes in standard materials and specifications that would yield no apparent benefit.

It is hoped the members of the American Electric Railway Association will support the American Engineering Standards Committee to the limit and co-operate with it, which will be an action that will not only benefit a particular class, but the country and world as a whole.

MARTIN SCHREIBER,
Chairman Standards Committee,
American Electric Railway Engineering Association.

San Francisco Municipal Railway

CITY AND COUNTY OF SAN FRANCISCO
DEPARTMENT OF PUBLIC WORKS
Bureau of Engineering

April 20, 1921.

To the Editors:

In your issue of April 9, page 697, under the caption "Municipal Railway Falling Behind," by tables of computed figures an effort is made to discredit the operations of the Municipal Railways of San Francisco.

A deadly parallel is used to accomplish this purpose and an analysis of the table at the bottom of the page will show how very unfair the arrangement of this table is. The mileage of the United Railroads is 244.24, or about four times that of the Municipal Railways. You charge up to Maintenance Account for our mileage $667,506 as against $972,808 for the United Railroads and endeavor to soft-pedal this discrimination by the footnote carrying the depreciation on the United Railroads as included in the two previous accounts of Way and Structures and Equipment. This, of course, is juggling with figures and a solution in which the city must decline to acquiesce.

Substantially, to date, since the city started this enterprise there was a capital investment of $5,826,552.47. Eight hundred and ninety-nine thousand three hundred dollars of this capital has been paid back as the installment bonds matured. One million one hundred and eighty-eight thousand one hundred and fifty dollars of the earnings have been invested in making extensions and betterments to the original 45 miles of line. Cash assets in our treasury amount to $1,266,832.01, or a net earning of very nearly $3,300,000, besides paying interest on all outstanding bonds, and all accomplished since the Municipal Railways started operating, and without increasing the fare beyond 5 cents and paying $5 for eight hours' work to the carmen.

If this activity can be classified as "falling behind" we are quite willing to fall by paying our debts as bonds mature and making necessary extensions out of our earnings, which are rapidly accumulating.

Strange as it may seem this Municipal Railway has been kept out of politics and conducted on clean business principles. It is a pronounced success and has the good wishes of all the citizens of San Francisco as well as the admiration of all officials and visitors from other cities who come to see our activities.

M. M. O'SHAUGHNESSY,
City Engineer.

[In the article referred to it was not the purpose to show the results of operation or the financial condition of either the Municipal Railway or the United Railroads over the entire period of time that the Municipal Railway has been in operation. The thought was to show only the results of operation of the two systems for the year ended June 30, 1920, which was done. No attempt either was made to show or analyze the balance sheets for the two operating companies.

With regard to the depreciation item for the United Railroads, subsequent information shows that the United Lines actually added to its depreciation reserve $550,000 from its profit and loss account for the year. This undoubtedly should be added to the figure of $972,808, to give a fair comparison between the two systems. This would change the total maintenance expenses per car-mile from 3.791 to 5.941 cents, the car-hour expenses from $0.334 to $0.523. The percentage of revenues and expenses would be 16.89 and 21.86 instead of 10.78 and 15.20 respectively; the other percentages in these columns would necessarily have to be changed accordingly.—EDITORS.]

Association News

Committee on Purchases and Stores Meets

ON APRIL 22 the committee on purchases and stores of the Engineering Association held its initial meeting at association headquarters. Among those in attendance were W. H. Staub, purchasing agent United Railways & Electric Company, Baltimore, Md., chairman; J. Fleming, Capital Traction Company, Washington, D. C., and W. H. Ford, Memphis (Tenn.) Street Railway. The committee discussed many matters in general pertaining to the purchase of materials and supplies, and agreed to collaborate with the committee on stores accounting of the Accountants' Association with the object of submitting a joint report covering general subjects of stores accounting. It is the idea of this committee to include consideration of a material classification applicable to electric railways, similar to the one recommended by the Railway Storekeepers' Association for steam road operation. The committee will also ask those interested in purchasing subjects to submit suggestions for presentation by papers and discussion in an open meeting. The committee asked that a purchases and stores department section be inaugurated in *Aera* question box.

National Electric Railway Day

THE idea of setting aside May 4 as National Electric Railway Day has met with none but favorable response. While some companies have said they could not stage a public demonstration such as a parade, all have said that the idea was to be commended and they would do whatever was possible to help in calling the attention of the developments in the electric railway industry to the public, through the display of advertising matter and local newspaper stories.

The attitude in general taken by the companies replying to President Gadsden's recent letter is reflected by such statements as "the plan has our most hearty approval and you can depend on us for a most liberal program," "we will with pleasure and enthusiasm join in the program," "we are very much interested in the program and will be pleased to get the publicity matter," "we approve of the enterprise and will give the movement our fullest support."

Among the companies that have signified their intention of participating either wholly or in part are the Connecticut Company; Charleston (S. C.) Consolidated Railway & Electric Company; Schuylkill Railway Company, Girardville, Pa.; the Shreveport (La.) Railway; Morris County (N. J.) Traction Company; Chicago, Ottawa & Peoria Railway; Springfield (Mo.) Traction Company; Eastern Pennsylvania Railways, Pottsville, Pa.; United Railways & Electric Company of Baltimore.

The New Orleans Railway & Light Company is to put on the entire program some time in June, as it could not complete its arrangements at an earlier date along the lines it desires. Efforts are being made to get the Virginia Railway & Power Company to operate if possible one of its first electric cars over the original route in Richmond.

The advertising section of the Association's Bureau of Information and Service, which has this matter in charge, has already sent a national story on the developments of the industry to all newspapers. Copies of the same story, supplemented by photographs of two old cars, for reproduction, have been sent to the electric railways. Wall cards showing the growth in car design, for display in waiting rooms and other points of congregation, as well as a leaflet for distribution have been prepared and sent to all operating companies in the country.

While only a limited supply of leaflets has been sent, the association is in a position to furnish additional copies for general distribution at actual cost upon request. These illustrated leaflets have a wide field for distribution as the pictures contained therein enable the companies to put over the idea easier than with non-illustrated reading matter.

Chamber of Commerce President Addresses Camden Section

THE regular monthly meeting of the Camden company section of the American Association was held at the Newton Avenue carhouse on April 21, with seventy-five members in attendance.

At the request of President Wallace, LeRoy A. Goodwin, president of the Chamber of Commerce, Gloucester City, and president of the Rotary Club, Camden, addressed the meeting, bringing out principally what a real organization can accomplish by co-operation. The speaker won the hearts of his hearers by making the statement that he personally was for well conducted trolley service, and positively was against the jitney business. He also suggested a loop system for Camden, whereby the citizens in new sections would have convenient transportation rather than having to walk a number of squares to the nearest car line.

In the general discussion which followed, improvement in the service was the chief topic. Some interesting matters were brought to light, chief among them being the smoking nuisance on trolley cars.

Mr. Schreiber wound up the evening talk by stating that the general public should be impartial in its judgment of the trolleys. Without such services in the various suburban towns these towns could not advance, and should a receivership for the Public Service Railway become necessary, patrons would be obliged to pay additional fares to travel to the very communities that are now covered by single fares. Mr. Schreiber also read numerous letters that he had received complimenting the railway on its good service.

Commerce Chamber Meets

THERE was a large attendance at the meetings of the United States Chamber of Commerce, held at Atlantic City this week. The first general session was on Wednesday morning. This was followed by similar sessions on Thursday morning and Friday morning and afternoon, with group meetings on the afternoons of Wednesday and Thursday. Two special topics considered by each group were taxation and tariff.

The situation of the public utilities was considered in a paper by Edward N. Hurley of Chicago, entitled "The Arrested Development of Public Utilities," scheduled for presentation at the general session on Friday morning. The report of the directors of the organization on the work of the past year also contained a reference to Referendum No. 33 on electric railways, submitted Nov. 19, 1920, with the vote recorded on each of the eight propositions presented to the membership. The report of the committee on railroads, presented before the Transportation and Communications Group, was devoted to the trunk line railroad question and did not recommend additional legislation on the railroad question at the present time. Instead, it expressed the opinion that there should be further experience under the transportation act of 1920.

Connecticut Section A. I. E. E. Organized

THE thirty-second local section of the American Institute of Electrical Engineers was formally organized at New Haven, Conn., on April 22. It will be known as the Connecticut Section. The section will include all of Connecticut, with the possible exception of the corners of the State now within the radius of the New York, Pittsfield and Providence Sections and will have meetings at various points in the state.

The principal speaker at the organization dinner was Dr. William McClellan, leading candidate for the institute presidency for the coming year. He made a plea for the recognition by the section of its duty to develop a broad engineering atmosphere as well as to discuss technical engineering problems.

Charles F. Scott, professor of electrical engineering Yale University, was elected chairman of the section, and A. E. Knowlton, electrical engineer Public Utilities Commission of Connecticut and instructor in electrical engineering Yale University, secretary-treasurer.

French Electrification Progress

THE French Commission in the United States has recently issued a statement regarding progress which is being made in adapting electric motive power to heavy railroading in France. Electrification of more than 1,800 miles of track is under way, orders having been placed for fifty new electric locomotives of a type somewhat similar to that used by the Milwaukee Railway in this country. Two hydro-electric plants are being reconstructed, each to furnish 150,000 hp. to this railway, and this work is nearly complete.

The Orleans Company and the Paris-Lyons-Mediterranean Railway are planning to electrify about the same length of track. Electric power for the former will be furnished by the waterfalls of the Upper Dordogne River, while that for the "P. L. M." will come from the falls in the French Alps. The cost of electrifying all of these roads will be at least 5,000,000,000 francs and electrification is expected to save more than 3,000,000 tons of coal per annum.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Wage Cut Rejected

Arbitration May, However, Be Resorted to in Detroit Controversy—Men Name Representative

The proposed reduction of wages suggested by the Detroit (Mich.) United Railway to become effective on May 1 has been rejected by the men. No agreement has been reached relative to arbitration. The men have, however, asked for a conference with officers of the company, with a view to discussing and considering the situation in the hope of being able to reach an understanding on the agreement covering wages and working conditions or to arrange to submit the questions to arbitration if an understanding could not be reached. A resolution passed by the men in mass meeting requested that the old contract be continued, with the wages and working conditions unchanged.

It was further resolved that should the joint committee and the officials of the company fail to reach a satisfactory settlement before May 1, 1921, the company should be notified that an arbitrary reduction in wages and change in working conditions will not be accepted.

A conference between the representatives of the union and company officials did not bring any definite results. While the company is willing to consider arbitrating the entire agreement with employees, arbitration of the wage question alone is not looked upon with favor by the company.

In a letter sent to Frank W. Brooks, president of the company, the joint committee states that there appears to be either an oversight or misunderstanding on the part of the company as to the time the present wage went into effect. While the company officials seem to be under the impression that the present wage went into effect on May 1, 1920, the men contend that the present rate did not go into effect until May 16, 1920, and that it was to be for one year.

As a basis of settlement for wages and other questions in dispute as submitted in the company's proposed agreement the committee makes the following proposition:

> That these questions should be submitted to a board of arbitration of three persons as the agreement provides and the decision of a majority of the board of arbitration to be final and binding upon both parties.
>
> That the present wage rate and working condition continue in effect until the board of arbitrators have made their award.
>
> That should the time of the board of arbitration extend beyond May 16 the arbitration board be empowered to say whether any decrease or increase which hey may award shall be retroactive.
>
> That should there be an increase the company is to pay the same from May 16, 1921; if there be a decrease the decrease s to be taken from the wage of the employee from May 16, 1921, and in order to assure the company against any loss in case where an employee might leave the service of the company before the company had the opportunity to deduct any decrease the organization will place in the hands of the Peoples State Bank of Detroit, Mich., the sum of $50,000 to meet any such shortage.

For the purpose of completing and getting the arbitration board into operation the committee has named Frank D. Eaman as arbitrator for the men.

Following the conference with the men President Brooks issued a statement in which it was cited that representatives of the employees had been advised of the financial inability of the company to continue the present wartime wages on the existing rates of fare and that the necessity had been made clear for a wage readjustment on May 1 to meet existing conditions.

As to the matter of arbitration Mr. Brooks explained that the company now, as always, stood ready to submit all differences to the judgment and decision of such a board, and that if the offer the company has made is not acceptable then the company is willing to submit the entire agreement to a board of arbitration and pending the decision the rates of pay and working conditions offered by the company are to be put into effect on May 1, in accordance with the notice to the men.

Cost-Plus System Favored

The Fort Wayne Federation of Labor has expressed a preference for the cost-plus system of determining fares for the city lines in Fort Wayne and a resolution setting forth the federation's position in the matter has been presented to the City Council, as follows:

> The federation's committee appointed to investigate the railway situation has decided to ask the federation to endorse the cost-plus plan of railway operation and to ask the City Council to appoint a committee to confer with this committee to study the possibility of installing such a plan in Fort Wayne.
>
> Your committee is well aware that the company is entitled to a fair and just return on the money actually invested and no more. On the other hand, the citizens are entitled to a first-class service at as low a cost as is possible. We believe that the cost-plus plan if properly installed will meet the purposes.

In his statement giving the reasons for asking for a rehearing the city attorney alludes to the matter of maintenance.

"The city of Fort Wayne is desirous that proper service be maintained, but it believes it unjust to do an abnormal amount of maintenance work, rebuilding of lines and such in a very short time, thus taxing the present car riders more than their just burden to satisfy the desire of the present operator to get his Fort Wayne lines in the very best possible condition at the earliest possible moment."

Investigation in Boston

Outside Influence Shown to Be Negligible in Effecting Passage of Public Control Acts

The investigating committee of the Massachusetts Legislature, recently appointed to look into charges of irregularities alleged to have existed in connection with the passage of street railway legislation in 1918 and 1919, has been engaged in questioning the men who were members of the two houses during those years. The committee has appointed George S. Taft, former district attorney of Worcester County, to act as counsel. The committee itself consists of five members of the present Legislature, none of whom was connected with that body in 1918.

At present all testimony is voluntary, each former legislator being called upon to waive his immunity rights before testifying. All witnesses are duly sworn before giving testimony. Only two have so far refused to testify voluntarily.

Governor Cox a Witness

Among those who have appeared before the committee is Channing H. Cox, now Governor of the State. Governor Cox was a prominent member of the 1918 Legislature, being speaker of the House of Representatives at that time. He upheld the street railway relief legislation as it was enacted at that time, and had no apologies to offer for it. He testified that he knew of no irregularities or improper influences exerted on legislators in behalf of the street railway bills.

There is some indication that an attempt will be made to invite Vice-President Calvin Coolidge, former Governor of Massachusetts, to come before the committee.

Several members of the former Legislature have admitted having purchased stock of the Boston Elevated and Massachusetts Electric companies, anticipating a probable rise in market value of those securities upon the passage of the public control and other favorable legislation. The ranks of the speculators included some legislators who opposed the bills and voted against them. In general they maintain that they believed they had a perfect right as individuals to do so, claiming their votes were not influenced thereby.

Each witness is first asked a series of specific questions designed to bring out whether or not any improper influence was brought to bear on him or whether any inducement was offered to secure votes in favor of the legislation. Each witness is also asked whether he bought any securities of the street railways involved, either directly themselves, or indirectly through others.

Although a few above mentioned admitted having speculated in the stock, all have denied any improper influence or inducement. Some have claimed that strong political pressure was brought to bear, and one or two have mentioned "corridor gossip" involving the possible financial advantage to be gained by speculating in the stock, but no specific names or concrete facts have been given of any irregular influences.

Following the standard interrogatories of counsel, each man is given an opportunity to make any informal statement he may desire. A number have taken the opportunity to praise the legislation, especially the Boston Elevated public control act, and have classed it as one of the most popular and cleanest pieces of corporation legislation ever passed.

The Boston daily papers, with the exception of the newly-established *Boston Telegram*, do not seem to take the present investigation very seriously. While fully reporting it in the news columns, very little editorial comment has been aroused. The Boston papers were unanimously in favor of the public control act in 1918.

Some little resentment has been aroused in banking and financial circles because of the action of the committee in sending an auditor to examine into their books and records of customers' transactions.

The committee's counsel, Mr. Taft, has given as his opinion that the Boston Elevated public control act is in the nature of a contract between the State and the Elevated Railway stockholders, and has hinted that legislators who owned stock and voted on the legislation relating to this alleged contract are liable to prosecution under the laws of the Commonwealth.

New Franchise in Effect

Details Are Reviewed of Outstanding Provisions of New Service-at-Cost Grant at Findlay

The new service-at-cost franchise for the city lines of the Toledo, Bowling Green & Southern Traction Company at Findlay, Ohio, went into effect on March 17. Fares are now 8 cents. C. E. Hart, D. Fortflowers, and M. D. Neff have been named by the City Council as the members of the first street railway commission. They will have power under the ordinance to regulate the service and determine when fare increases or decreases shall take effect under the new plan. The service and safety director of the city has since been named street railway director.

THE new service-at-cost franchise accepted on Feb. 14 by the Toledo, Bowling Green & Southern Traction Company modifies the twenty-five-year franchise in Findlay granted on Feb. 23, 1915. The franchise contains a number of interesting features.

One of these covers the appointment of the Commission of Control. This body is to consist of three members, each elected for a term of three years. The commissioners serve without pay. The Mayor transmits to the Council a list containing twice as many names as places to be filled, and from this list the Council fills the vacancies. The control of the service is in the hands of this commission except that it is not permitted to make "such requirements as will prevent the production of sufficient revenue to maintain the stablizing account."

Moreover, the commissioners have no control over temporary or emergency measures that may be taken by the company, and they work through the present city official known as the director of public service, who receives no extra compensation for the added responsibility but can employ necessary assistants at the expense of the railway.

Section 5 provides that the "traction company," which includes the interurban lines, shall pay 0.45 cents per ton car mile to the city street railway for the use of the track by the interurban passenger and freight motor cars and trailers in addition to a power charge.

Funds derived from the sale of property and not applied to the payment or retirement of outstanding bond issues may be used for extensions, betterments of permanent railway improvements, provided it is so agreed by the traction company, the trustee for the bondholders and the commission, but no additions are to be made to capital value for extensions, improvements and betterments so required. These funds may also be used for the renewal of existing equipment or property. If funds received from such a sale are not used for improvements of the property the capital value of the city street railway is to be reduced proportionately.

Section 10 provides that the value of the physical property of the city railway be set at $180,000 and on this amount the company is permitted a return of 7 per cent.

Section 11 provides for the stabilizing account which is to be $20,000, less prepaid accounts on the books of the city street railway, and this sum is recognized as part of the capitalization of the city street railway.

Section 12 provides that the traction company shall receive an allowance of 15 cents per car mile for operating expenses such as power, insurance, payment of claims, overhead expenses proportionate to the service, etc. The operating allowance is also to include not more than $400 a month to the traction company for joint services such as executive salaries and rental expense. These joint charges are not to be in excess of 12 per cent of the total operating allowance for any one month.

Section 13 provides for an additional allowance of 3½ cents per car mile exclusive of the car miles traveled by work cars for maintenance, which will be used exclusively for the upkeep of the city street railway property. In addition there is an allowance of 3 per cent of the capital value of the property (less land value and stabilizing account) for renewal and depreciation allowance. Such allowance cannot be used to make improvements which can be capitalized.

There is a sliding scale of fares, beginning at 8 cents cash, fourteen tickets for a dollar, or seven tickets for 50 cents. Increases or decreases are made according to regular schedule when the $20,000 stabilizing fund reaches $25,000 or drops to $15,000.

In case the traction company fails to carry out the conditions of the franchise after thirty days' written notice the commission can take over the street railway property and operate it until the traction company complies with the terms of the ordinance. During the time the city operates the railway all net income after paying current operating and maintenance charges are to be credited to the stabilizing account.

City Attacks New Law

An order was obtained on April 25 by the City of New York in the Supreme Court for the new Transit Commissioners of New York to show cause why they should not be restrained from entering upon their new duties and that the present Transit Construction Commissioner should show why he should not be restrained from turning over to the new body the records of the commissioner's office. The new commission in New York City has since taken charge over the protest of Rapid Transit Construction Commissioner Delaney.

Jitney Operators Arrested

The police of Albany, N. Y., under the direction of Public Safety Commissioner Frost, on April 22, started making wholesale arrests of jitney bus operators. All of those arraigned demanded jury trials, were admitted to bail and in many instances resumed operation of their cars.

The situation is a peculiar one in that Mayor Watt has recently been served with an injunction restraining the operation of jitneys in competition with the United Traction Company's cars and has made an appeal on the injunction. Corporation Counsel McManus holds the Mayor without authority to stop jitney service pending the result of the appeal, but the Commissioner of Public Safety has gone over the Mayor's head in the exercise of the police power to stop the service.

In spite of the fact the railway states the strike of its trainmen is broken Justice Hinman of the Supreme Court on April 21 ruled that the ban against picketing by former employees of the United Traction Company be continued.

For the first time since the strike began twelve weeks ago service was resumed by the United Traction Company in Rensselaer on April 22.

Interurban Announces Wage Cut

Wages of motormen and conductors employed by the Cleveland, Columbus & Southwestern Railway, an interurban road that taps territory southwest of Cleveland, are to be reduced on May 1, officials of the company have just announced.

The exact amount of the reduction has not been definitely determined but officials have stated that the financial conditions of the road makes it necessary to reduce the wages of the trainmen at least 20 per cent. This is the amount of the reduction accepted by the local Cleveland trainmen.

The wages paid by the Cleveland, Columbus & Southwestern Railway now are 55 cents an hour for first three months; 58 cents an hour for the next nine months and 60 cents an hour for all men in the service longer than one year. It is likely that the highest rate the men will receive after May 1 will be 48 cents an hour.

Changes in Proposed Florida Bill

With ten Florida cities represented by their mayor or some other high official protesting vigorously and presenting protests from fifty other communities the Railroad Commission has decided it will not press its bill for the creating of a Florida public utilities commission in its present form and that the clause giving the proposed commission control over municipally owned public utilities will be stricken from the proposed measure. The announcement was made by the commission's chairman, R. Hudson Burr, after a hearing of one hour on the bill by the Senate committee to which it had been referred by the Senate now in session at Tallahassee, Fla.

The proposed bill would create a public utilities commission to take over the duties of the present Railroad Commission and to take control of all public utilities such as electric, gas, water plants, etc. It was drawn by the Railroad Commission, presented by its attorney, who is a state Senator, and was referred to a committee of which the attorney was a member. This series of circumstances has heightened the hue and cry against the measure.

Peter O. Knight, general counsel for Stone & Webster in the Florida district, has expressed himself as follows:

> I have become convinced that regulation of public utilities has come to stay. I know when I'm licked; and if we have to have regulation the companies I represent want intelligent regulation by an efficient body that can demand and enforce its demands. We do not want picayunish political regulation as inconsistent as the wind of hot-air politicians. We want what we are entitled to and that's all. I am not particularly in favor of this bill but I am not fighting it. We are willing to accept it as preferable to political regulation, that's all.

$1,700,000 for Rapid Transit Changes in Queens

The problem of how to operate trains of the Interborough Rapid Transit Company and Brooklyn Rapid Transit Company with cars of different width over the same tracks in Queens Borough, New York City, has been solved by Transit Construction Commissioner John H. Delaney. Double rails will be laid, the Interborough using those already placed and the Brooklyn Rapid Transit trains to use those to be laid immediately. The double rails will make necessary some minor changes in equipment.

The tracks were laid by the Interborough Company, which uses cars about 12 in. narrower than those of the Brooklyn Rapid Transit Company. The Interborough refused to spend money to make changes for the accommodation of a rival, even though the contract called for dual operation. Commissioner Delaney ordered the company to make the changes and the courts were appealed to. The litigation resulted in a victory for the Interborough. Mr. Delaney on April 9 said that 16 miles of single track would be affected, and he estimated the cost of track changes at $800,000. Independent signaling and third-rail service will cost $300,000 more, and the cost of structural changes at the various stations on the new line in Queens is estimated at $600,000.

Commission's Powers Widened

Authority of Minnesota Body Extended to Electric Railway Rates, but Cities Control Service

General satisfaction exists in cities in Minnesota that have electric railways over the final passage of the amended street railway bill by the Minnesota Legislature and its signature by Governor J. A. O. Preus. The bill passed the House on April 13 by a vote of sixty-nine to fifty-seven. The amended bill passed the Senate on April 14, when the body concurred in the House amendments. It was signed by the Governor on April 16.

UNDER the new law rate control is vested in the State Railroad & Warehouse Commission with jurisdiction to the cities over routings and extensions. The commission is authorized to establish an emergency increase before a revaluation can be made and a permanent rate established.

The law settles the status of franchises soon to expire in the various cities by providing for the new indeterminate franchise method. The measure is on this account expected to stabilize business and to assist the companies in arranging new financing.

Not the least of the benefits will be to remove the question of fares from city councils and place it in the hands of a commission which is expert in the matter of rates and of valuations. However, the right of the cities to appeal to the courts under proper circumstances is reserved, as well as all local matters pertaining to new lines, etc., thus leaving intact the cities' home rule.

The railway lines in both Minneapolis and St. Paul are operating at a 6-cent fare. In Minneapolis the Twin City Rapid Transit Company already had authority to increase the fare to 7 cents, and in St. Paul to 7 cents after the Council had determined whether the railway has established service previously agreed upon as being necessary.

A summary of the provisions of the bill follows:

Section 1. Defines terms used in the bill.

Section 2. Provides that existing grants to street railways of the state and those made in the future shall be indeterminate permits—permits to do business until purchase of the property by the city or until termination or modification of these permits by the legislature. Acceptance of the indeterminate grant by companies now operating is optional, however. All terms, conditions and obligations of existing franchises are continued in force except as otherwise provided in the bill.

Section 3. Provides for purchase of the company's property by the city at a valuation fixed by the commission, whose decision in the matter is subject to appeal to the District Court of the county in which the company operates. This property may, moreover, be acquired by condemnation proceedings, or by agreement.

Section 4. Perpetuates the right of the cities to say what manner of service the street railways must furnish. This authority is made final and is not subject to appeal by the street railway.

Section 5. Grants the Railroad and Warehouse Commission authority to fix reasonable rates of fare, subject to appeal to the District Court of the county in which the company operates.

Section 6. Provides more particularly for continuous intercity passenger service, having in mind more particularly the peculiar situation which exists because of the physical proximity of Minneapolis and St. Paul.

Section 7. Provides that the company must obtain authority of the commission before it can issue stocks, bonds or other evidences of indebtedness payable at periods of more than one year, and further provides that the street railway shall not issue evidences of indebtedness when their value, together with other outstanding securities exceeds the fair value of the property. This makes watered stock impossible.

Section 8. Gives the commission authority to establish rates of fare, either on its own initiative or on the application of either the city or the street railway, and provides that such rate shall be based on a valuation of the street railway's property. This section further provides that the commission shall have access at all times to the records and accounts of the street railways.

Section 9. Authorizes the commission to determine and fix the fair value of the street railway if the petition of the city be filed with the intention of acquiring such property. If the petition be to fix a rate of fare, the commission is to allow a rate which will yield only a reasonable return on the fair value of the property.

Section 10. Provides that the city or street railway may appeal to the District Court of the county in which the street railway operates from any ruling of the commission, and that the court shall try the case *de novo*, taking into consideration any evidence offered, whether excluded by the commission or not. An appeal from the decision of the District Court may be taken to the Supreme Court.

Section 11. Provides for use of city lines by suburban railway. The compensation to be paid is to be fixed by mutual agreement if possible, subject to the approval of the Council, but in the event of the failure to agree the Council is to fix the compensation, subject to appeal to the District Court.

Section 12. Declares that no grant shall be issued to a street railway to operate in a city in which another street railway is then operating unless a certificate of convenience and necessity is first obtained from the commission after a hearing.

Section 13. Vests in the commission the authority to prescribe a system of accounting, prescribe depreciation, and control the disposition of money in the depreciation fund. This section compels the company to furnish the commission annually full financial reports, and any additional reports that the commission may request.

Section 14. Reserves to the state the right to modify, amend or repeal the act, or to cancel or modify any indeterminate permit. It prohibits the granting of an indeterminate permit to other than a Minnesota corporation.

Section 15. Repeals all legislation conflicting with the provisions of the act.

Section 16. Makes the act effective from and after its passage.

Formal acceptance of the provisions of the new law was sanctioned by the directors of the Twin City Rapid Transit Company on April 22. President Horace Lowry said:

> The board decided to accept the indeterminate permit as provided by the law, and to work under the new act. As to the service in the Twin Cities there will be no immediate effect except that we will continue our efforts to improve the service. Details of changes will have to be worked out.

In commenting on the act when it passed Mr. Lowry said:

> I am glad the Legislature has seen fit to pass a law which will strengthen the credit of street railways and will, I hope, enable our companies to obtain the funds necessary to build up and expand our system of transportation to meet the needs of these growing cities and the surrounding country.
>
> The public, however, must realize that under the act it will take the commission some little time to determine the fair value of the property and that this must be done before we can ask the investing public to lend us the money we need to do even the work and paving now ordered.
>
> The company, through its officers, during the discussion of the bill pledged itself to do its best to go forward in the public interest. The passage of this act increases the responsibility of the company to the car riding public, and at this time I wish to assure our patrons that we propose to the best of our ability in letter and spirit to live up to all that we have promised.

The exact date for filing of declarations with the city clerk is not determined. The certificates which the clerks will issue, when filed with the Secretary of State, place the companies under the indeterminate franchises provided for in the new law.

Strike Likely on Eastern Massachusetts Street Railway

Unless some unexpected eleventh hour development occurs to change their plans, the employees of the Eastern Massachusetts Street Railway are expected to go on strike on May 2. According to figures given out by the union officials, the men voted overwhelmingly against accepting either of the alternative propositions offered by the public trustees. The latter on Feb. 25 announced a 20 per cent reduction in wages, effective May 2, the union contract expiring May 1, and since then, as an alternative, have offered to arbitrate the wage question, but only on condition that an open shop policy will be followed. Neither of these was acceptable to the union.

The men are demanding arbitration on the basis of possible changes in the existing agreement. The trustees, however, in their original notice to the employees, signified their intention to cancel in its entirety the present union agreement at its expiration, May 1.

The trustees have announced that they intend to operate the road whether or not the present employees quit.

The trustees have sent announcements to the public officials and the newspapers in the various cities and towns that their intentions in reducing wages are solely along the lines of making reductions in car fares, and that the company does not expect to profit by lower wages.

Advantageous Advertising Contract

United Railways, St. Louis, Will Increase Revenue 300 per Cent Under New Arrangement

In letting a contract to the Western Advertising Company for space on and in the cars of the United Railways, St. Louis, Mo., beginning on Oct. 1, 1921, Rolla Wells, receiver, has included the dashboard space which heretofore has been reserved by the railway for civic and charity purposes, or used to stimulate travel. This increased space was a factor in the 300 per cent increase in revenue the company will gain from the new advertising contract.

$191,300 FOR TEN YEARS

The contract is for ten years at $191,300 a year. When the receiver took charge two years ago, the company was receiving $64,000 annually for advertising space. Last year this sum was raised to $80,000, under a temporary settlement effected in the United States Circuit Court. Last month, by order of the court, new bids were called for and they were opened a few days ago. There were four bids, and the minimum under the new allotment of space including dashboards was $150,000.

Separate bids for inside and outside the cars were not called for, and therefore no indication was given as to how much the bidders considered the dashboard space to be worth—two dashboards on the fronts of all the 1,500 cars operated by the company. The periods of time called for were five and ten years, and it was found that the Western Advertising Company, the highest bidder, offered $10,000 a year more for a ten-year contract than a five-year contract. The receiver accepted the ten-year agreement, $191,300 annually, and it is expected the Federal Court will approve it.

RAILWAY RESERVED LITTLE SPACE

The only space reserved by the company for its own purposes is the lightbox sign space, and on the glass of the windows when the windows are closed. The company's publicity will take some other form, and Col. A. T. Perkins, manager for the receiver, is now considering the publication and distribution of folders for car riders. It is figured that 500,000 folders can be printed and distributed every month for about 4 per cent of the increased revenue the company gets for the advertising space.

Wage Cut Demanded

Railway at Youngstown Insists Upon 25 per Cent Reduction and Changes in Working Conditions

G. T. Seely, vice-president and general manager of the Pennsylvania-Ohio Electric Company and president of the Youngstown Municipal Railway, has transmitted to the trainmen in the employ of these companies a draft of a new agreement for the ensuing year embodying a wage scale of 45 cents an hour for the first three months, 48 cents for the next nine months and 50 cents an hour thereafter, with 5 cents an hour additional for operators of one-man cars.

The present contract governing the wages and working conditions of the trainmen has been in force since April 1, 1920. It expires May 31, 1921.

TWENTY-FIVE PER CENT REDUCTION

The rates of wage paid under this contract are 60 cents an hour for the first three months of employment, 63 cents an hour for the next nine months and 68 cents an hour thereafter, and 5 cents an hour additional for operators of safety cars. By far the largest number of men come under the higher classifications. The rates of wage in the last previous contract were 43 cents an hour for the first three months, 46 cents an hour for the next nine months and 48 cents an hour thereafter. The rates in the present contract are more than 40 per cent above those specified in the last previous contract and 120 per cent greater than the rates of wage paid in 1914 prior to the beginning of the world war.

Mr. Seely explains to the men that after a year's experience with the present scale, it has been conclusively demonstrated that this rate of wage cannot be continued as the earnings are not sufficient properly to maintain the property or provide any return on the investment. Mr. Seely says that the only excuse for such an intolerable condition being permitted to exist temporarily was the excessively high cost of living in effect in April, 1920, when the last contract was negotiated. In this connection he says:

> Now that the cost of living has materially declined, this temporary situation no longer exists and the public interest requires an adjustment; and I am, therefore, taking this opportunity to inform you that this company cannot continue the present wage agreement beyond the date fixed therein, May 31, 1921, and that any new wage agreement must of necessity be much lower than the present wage in all rates.

At the same time Mr. Seely has explained that some of the working conditions under the present contract are a survival of years when different operating conditions existed and are of such a nature as to interfere with efficient operation. He says that the conditions which should be modified or eliminated are those—

1. Requiring and enforcing absolute closed shop and interfering with free selection of men.
2. Requiring all runs to be early and late—a situation which renders operation costly and inefficient.
3. Requiring unnecessary expenditures

for pilots to accompany crews already familiar with road.

4. Requiring higher rates of wages for certain work that would be largely sought by trainmen at standard rates.

5. Requiring excessive penalty payments for overtime.

6. Prohibiting operation of safety cars on lines on which special agreement has been made, thus tending to limit the company in providing adequate service to the public.

Cars Reflect Europe's Devastation

A recent traveler through after-the-war Europe has brought back to this country harrowing tales of the electric railway industry in Budapest. He says:

> As for the street cars, I never saw such woe-begone specimens as those of Budapest. They used to be brown or yellow, but now nearly every one of them is a nondescrpt blackish-gray, a color without a name. Their wheels and the rest of their machinery are so rusty that the poor cars wheeze and creak and groan as if they were about to fall to pieces any minute. Their windows won't work; the platform steps sag when one puts a foot on them. As these faded imitations of trolley cars jolt along Budapest's dirty thoroughfares they seem like mangy street curs sneaking along the gutters in search of a bone.

Some Contemporaries of the Five-Cent Fare

Nelson, Cook & Company, Baltimore, Md., in their market letter of April, comment upon the agitation for a restoration of the 5-cent fare in that city. They say:

> Now is not the time to restore the old 5-cent fare, nor would it be feasible for the city of Baltimore even if the proposition were considered a good one, to take advantage of the old agreement contained in the original franchises whereby the city has the privilege at given periods of purchasing the old City Passenger Railway lines. The return of the 5-cent carfare will be contemporaneous with the return of the 1-cent newspaper, the $4 a day mechanic, the $10 a week stenographer, and similar quotations of a former day.

News Notes

Carmen Suggest Wage Cut.—The manager of the Altoona & Logan Valley Electric Railway, Altoona, Pa., has been notified that the employees will voluntarily accept a wage reduction of 5 cents an hour beginning May 1. The scale has been 55, 57½ and 60 cents, according to length of service.

Wage Offer Rejected.—Employees of the Des Moines (Ia.) City Railway, by an overwhelming vote, have rejected the proposition submited by the company which placed the maximum wage at 60 cents. The present working agreement between the men and the company expired on March 1. If an agreement cannot be reached the wage question will be submitted to arbitration.

Plans Study of Trackless Trolley.—An investigation of the feasibility of installing the trackless trolley in Cincinnati, Ohio, was started by William C. Culkins, formerly director of street railways. Mr. Culkins said that the trackless trolley might be very useful and successful in parts of the city where extensions of the railway are really needed but where the expense of installing such railway extensions would be prohibitive.

Sioux City Men Face Wage Cut.—Sufficient revenue has not been obtained by Sioux City (Ia.) Service Company from fare granted last year to maintain the present wage scale and a readjustment has been asked. The men were granted an increase last year, making the hourly scale 50 to 60 cents with 7 cents additional per hour for operating one-man cars. It is intimated that a 10 per cent reduction will be asked.

Safety and Courtesy Win Merit.—To place special emphasis on safety and courtesy the Los Angeles (Cal.) Railway has announced a slight change in the merit system, under which credits are computed for the Christmas cash bonus. The 25 credits formerly given for a clear record for one month will be discontinued and instead, regardless of the number of demerits which a man has received for other reasons, ten credits will be given monthly to each man who maintains a clear courtesy record for one month and ten credits to each man who maintains a clear safety record for each month.

Municipalization Urged.—A large delegation from Niagara Falls, St. Catharines and other surrounding municipalities waited on J. D. Reid, Minister of Railways and Canals in the Dominion Government, recently to request the Government to acceede to the immediate purchase of the Niagara, St. Catharines & Toronto Railway by the Niagara Radial Railway Union. In reply Dr. Reid stated that it was impossible to take any action pending the report of the Royal (Sutherland) Commission appointed by the Ontario Government and which is now investigating the whole question of Hydro Radials within the province of Ontario.

No Progress Made on Toledo Agreement.—The possibility of a strike of trainmen of the Toledo Railways & Light Company, Toledo, Ohio, has been hinted by the union men, who are now working without any contract covering working conditions or wages. At the expiration of the contract nearly a month ago negotiations were begun looking toward a new agreement but no progress has been made. The company proposed a slight reduction in wages, but the men turned the contract down and have not made any compromise offer. In view of the deficits in the operation of the Community Traction system it is almost a certainty that the street railway commissioner will ask for a reduction of wages as an effort to forestall an advance in fares in August.

Nine-Cent Wage Increase Asked.—Employees of the Syracuse & Suburban Railroad, Syracuse, N. Y., which since its resumption a month ago has been operating one-man cars, have taken the initiative with respect to a contract to replace the present agreement, which expires on May 1. They have submitted a new contract calling for a wage increase from 56 cents an hour, the present scale, to 65 cents, basing their demand on the increased difficulty of operation of the one-man cars. The present contract was negotiated last May as the result of a strike. After the road suspended operation on Jan. 1 of this year General Manager Allen declared that the shut-down canceled the contract, and if the road resumed it would pay the men only 42 cents an hour, a reduction of 25 per cent. It was later decided to continue the scale in effect for two-man cars to the one-man car operators until the expiration of the contract.

Glasgow Against Underground Lines.—In reference to the great congestion of street traffic in the center of Glasgow, James Dalrymple, general manager of tramways, reported early in March to a committee of the Town Council against the construction of elevated or underground electric railways on account of the enormous capital cost and because the traffic would not yield sufficient revenue to meet the working expenses. What was needed, he said, was two additional bridges across the Clyde. The committee is recommending the construction of one of the proposed bridges with tramways on it, half the cost to be paid by the tramway department. The bridge and the necessary land are estimated to cost £840,000. For linking together outlying districts, where the present cost of tramway construction would be too high, Mr. Dalrymple favored the trackless trolley system of cars which could be worked much more cheaply than petrol motor omnibuses.

Objection Raised to Norfolk Grant.—At a recent public hearing before the City Council of Norfolk, Va., Tazewell Taylor, retained as special counsel by the Retail Merchants' Association in connection with the proposed new railway franchise for the Virginia Railway & Power Company, sharply criticised the franchise draft largely the work of A. Merritt Taylor, Philadelphia. He also entered objections to the provision for a utility board and for an 8 per cent return through a thirty-year franchise. He further attacked the idea of the city's pledging itself to renew the franchise or buy the property at the end of thirty years. Mr. Taylor believed that an examination of the company's books by the city would enable the city to fix a fare that would give a "just and fair return on the actual investment." The Norfolk Chamber of Commerce has retained Delos F. Wilcox, New York, as its adviser. A report by him on the pending franchise is expected within a few weeks.

Meeting of Association

New York Electric Railway Association

The thirty-ninth annual meeting of the New York Electric Railway Association will be held at the Fort William Henry Hotel, Lake George, N. Y., on Saturday, June 11.

Financial and Corporate

Call for Columbus Briefs

Special Master Hearing Charges of Mismanagement Expected to Report Soon

After months of intermittent hearings attorneys for the Columbus Railway, Power & Light Company, Columbus, Ohio, and for E. W. Clark & Company, Philadelphia, respectively, have closed their arguments and the master commissioner who has been hearing the testimony has asked for the filing of briefs by both sides in the controversy between the two interests.

The litigation arose through the filing of the Slaymaker receivership suit many months ago, brought by a stockholder to compel an accounting and if possible precipitate a receivership. Into this situation attorneys for the Columbus Railway, Power & Light Company injected evidence tending to place the blame for the alleged mismanagement of the company on the Clark interests, engineering and financial agents for the railway for years.

Charges were made at the hearings that the Clark company realized a large profit for handling the bonds and notes of the Columbus company, while at the same time it was receiving fees for acting as its agent. An analysis of the Clark company's records was introduced by the rail-light attorneys covering various transactions. In one instance alone, that of Feb. 1, 1916, it was sought to show E. W. Clark & Company received from the rail-light company $3,500,000 in bonds, at 90 per cent of par, or $3,150,000, and that the Clark company within ten days made a profit of $82,557 on the bonds.

This record, attorneys for the company contend, bears out the charge made by Charles L. Kurtz, president of the company, that at the time the bonds were disposed of a much better price than 90 could have been secured by the company. One million dollars of bonds issued on May 3, 1917, are alleged to have gone through a somewhat similar procedure, despite objections raised by Mr. Kurtz, then merely a stockholder.

Further testimony was adduced to the effect that cash vouchers for money drawn by E. K. Stewart, general manager and treasurer of the Columbus company during the Clark alliance, were unsupported by any accompanying papers.

Documentary evidence was also introduced by Attorney Edward C. Turner, counsel for the rail-light company, purporting to show that the Clark company drew labor and construction fees totaling $165,075, in connection with the building of power stations. Mr. Turner contended that the Clark company was not entitled to these fees in addition to what it was already receiving. He also held improper a discount of $86,000 taken by the Clark company on securities handled by it.

It was testified in connection with the reorganization of the railway in 1919, after the court had threatened to appoint a receiver unless a new management should be provided, that Mr. Stewart refused to vote either for the ousting of the Clark interests or for any new official or director. Two other directors who voted against a change switched their votes later but Mr. Stewart held out, it was testified.

Master Commissioner George B. Okey, in charge of the case, may not report his findings for some time.

$152,119,927 of Securities Authorized

During the twelve months ended Dec. 31, 1920, California utilities filed with the Railroad Commission applications to issue securities that aggregated $179,668,083. The commission approved applications to the extent of $152,119,927, denied applications totaling $250,500, dismissed requests aggregating $3,491,560 and on Dec. 31 had pending applications totaling $50,678,783. In only two years since the effective date of the Public Utilities act, March 23, 1912, has the amount of securities authorized by the commission in 1920 been exceeded. In 1914 the commission authorized $226,725,501 and in 1916 $186,633,146. In 1919 the issues amounted to $72,774,902. Since March 23, 1912, the grand total of securities authorized by the commission amounts to $1,084,560,452.

Permission to issue securities was obtained by the several classes of utilities as follows:

	Twelve Months Ended Dec. 31, 1920	Twelve Months Ended Dec. 31, 1919
Steam railroads	$4,523,354	$4,812,811
Electric railways	46,434,279	8,867,562
Gas and electric companies	82,515,708	56,095,461
Water companies	12,215,650	1,445,831
Telephone and telegraph companies	2,990,755	161,390
Warehouse companies	401,050	634,200
Paper companies	....	....
Pipe line companies	....	....
Steamship companies	14,100	540,340
Motor companies	3,025,031	217,305
Total	$152,119,927	$72,774,902

The securities authorized to be issued were for the following purposes:

Purpose	Twelve Months Ended Dec. 31, 1920	Twelve Months Ended Dec. 31, 1919
To install additions and betterments	$73,045,192	$43,708,588
To refund indebtedness	3,508,460	18,526 152
To be used for collateral	29,580 000	797,000
For reorganisation purpcses	43,594,500	9 743,162
For miscellaneous purpcses	2,391 775	....
Total	$152,119,927	$72,774,902

Bondholders' Status Fixed

Holders of Underlying Securities Benefit by Ruling of Court of Appeals of Ohio

Holders of the underlying bonds of the former Cincinnati, Dayton & Toledo Traction Company's system between Cincinnati and Dayton, Ohio, benefit by a decision handed down by the Court of Appeals at Cincinnati, Ohio, in a case which came up from the Butler County Courts. The decision written by Judge Wade Cushing and concurred in by Judges F. M. Hamilton and Robert Z. Buchwalter gives these mortgagees rights in a $500,000 power plant near Hamilton built by the Cincinnati Traction Company.

The Cincinnati, Dayton & Toledo Traction Company was formed by consolidating six separate companies which operated portions of what later became the single traction line. The Butler County Common Pleas Court ruled against the holders of the bonds of these companies upon their claims against the power house, and they appealed to the Court of Appeals. That body now holds that the underlying bondholders or mortgagees are entitled to have their rights restored to the condition they were in when the system was operated as the Cincinnati, Dayton & Toledo Traction Company, or to have such an interest in the new power house as would equal the cost of such restoration.

This ruling was made upon the ground that when the new power house was built the five separate power houses were destroyed. The decision also holds that the underlying bondholders have similar rights in the new rolling stock, which was bought to replace old rolling stock sold or scrapped by the new company. Regarding the dispute over $250,000 which accumulated in the net earnings fund the court declares the operating company and the State Public Utilities Commission were neglectful as the net earnings should be apportioned among the several divisions on the basis of their earning capacity, and the court suggests a master commissioner be appointed to decide the proportion of distribution.

Two Years' Operation Compared

Service-at-Cost in Boston Proves to Be Earning More Nearly the Fixed Return

During the twelve months that ended Dec. 31, 1920, total expenses of the Boston (Mass.) Elevated Railway including dividends as guaranteed under the public control act, exceeded total receipts by $346,952. This result, however, is a great improvement over the preceding year, which showed a loss of $2,366,494.

The text of the report is the same as that included in the trustees' report to the General Court for the year ended Nov. 30, 1920, which was reviewed in the ELECTRIC RAILWAY JOURNAL of Jan. 22, page 197, and Feb. 26, page 420. All figures, however, are brought down to Dec. 31, 1920.

The average cost of service during the entire year was 10.246 cents per revenue passenger against average receipts of 10.143 cents. The average cost of coal was $10.07 per ton.

The views of the public trustees on the subject of fares are clearly expressed in favor of continuing the 10-cent flat rate for the time being. The 5-cent fare service on certain short lines not in competition with 10-cent lines is considered experimental until results can be determined.

Proper provision for depreciation is another highly important factor cited by the trustees as a reason and necessity for maintaining fares at higher levels than in the past. In concluding their report, they say:

> The occasion for the advance in fares on street railways is not alone the greater cost of labor, materials and supplies, but as well a radical change in policy with reference to provision for depreciation. It is now generally admitted that no sane management would fail to set aside from current receipts a sufficient amount to meet renewal and replacement of property that is wearing out day by day. The practice of maintaining these properties by hand to mouth methods has proved disastrous and is being abandoned.

INCOME STATEMENT

Operating Income:	Year Ended Dec. 31, 1920	Year Ended Dec. 31, 1919	Percentage Change
Passenger revenue	$33,096,764	$28,752,675	15.2
Special car revenue	12,183	14,869	*18.1*
Mail revenue	737	722	2.1
Express revenue	88,658	89,003	*0.4*
Miscellaneous transportation revenue	4,383	3,002	46.2
Total revenue from transportation	$33,202,725	$28,860,271	14.8
Station and car privileges	300,228	293,872	2.2
Rent of tracks and facilities	39,059	41,477	*5.8*
Rent of equipment	1,644	5,210	*68.5*
Rent of buildings and other property	100,500	82,514	21.2
Power	92,192	46,349	99.0
Miscellaneous	14,515	74,898	*80.5*
Total revenue from other railway operations	$548,138	$544,320	0.7
Total railway operating revenues	33,750,863	29,404,591	14.7
Railway Operating Expenses:			
Way and structures	3,226,275	3,783,715	*14.7*
Equipment	4,033,850	4,290,049	*6.0*
Power	4,568,992	2,980,659	53.2
Conducting transportation	11,524,823	10,530,882	4.4
Traffic	3,358	4,758	*29.4*
General and miscellaneous	2,411,824	2,110,285	14.2
Total railway operating expenses	$25,769,122	$23,700,339	8.8
Net revenue, railway operations	7,981,741	5,704,252	40.0
Taxes assignable to railway operations	1,142,988	1,045,502	4.2
Operating income	6,838,753	4,658,753	16.8
Non-Operating Income:			
Income from lease of road	823	823	....
Dividend income	9,180	9,180	....
Income from funded securities	6,357	6,290	1.0
Income from unfunded securities and accounts	233,380	42,853	444.0
Income from sinking fund and other reserves	28,853	33,280	*13.3*
Miscellaneous income	2,181	1,565	38.5
Total non-operating income	$280,774	$93,991	199.0
Gross income	7,119,527	4,752,741	49.6
Deductions from Gross Income:			
Rent for leased roads:			
West End Street Railway Co.	$2,590,258	$2,540,893	2.0
West End Street Railway Co., Tremont Subway	177,686	176,545	0.6
Other roads	48,304	57,794	*16.4*
Total rent for leased roads	2,816,248	2,775,232	1.5
Miscellaneous rents	1,612,746	1,339,502	20.8
Net loss on miscellaneous physical property	9,326	7,986	16.8
Interest on funded debt	1,307,019	1,309,477	*0.2*
Interest on unfunded debt	207,945	246,313	*15.5*
Amortization of discount on funded debt	34,860	44,291	*21.3*
Miscellaneous debits	14,882	8,070	84.2
Total deductions from gross income	$6,003,026	$5,730,871	4.8
Net income transferred to credit of profit and loss	1,116,501	978,130	14.0
Proportion of dividends	1,463,668	1,403,970	4.3
Net loss or gain (including proportion of dividends)	*$347,167*	*$2,382,100*	85.2
Profit or loss—delayed items	215	15,605	....
Total deficit	*$346,952*	*$2,366,495*	

TRAFFIC STATISTICS

Year Ending December 31: Revenue Miles:	1920	1919	Percentage Change
Rapid transit passenger cars	14,540,474	14,139,619	2.9
Surface passenger cars	36,697,053	39,393,903	*6.8*
Express cars, etc.	106,635	175,020	*39.4*
Sprinkler cars	15,693	12,707	23.2
Total	51,359,855	53,721,249	*4.4*
Revenue Car Hours:			
Rapid transit passenger cars	984,150	978,591	0.8
Surface passenger cars	3,643,145	3,770,727	*3.3*
Express cars, etc.	10,218	16,765	39.1
Sprinkler cars	1,516	1,017	49.1
Total	4,639,029	4,767,100	2.7
Passengers Carried:			
Revenue passengers on rapid transit and surface cars	335,526,561	324,758,685	3.0
Miles of line	248.16	248.42	....
Miles of revenue track	461.87	462.56	....

Italic indicates deficit or decrease.

Financial Rearrangement Proposed

Another change is proposed in the financial structure of the Northern Ohio Traction & Light Company, Akron, Ohio. On May 16 the stockholders of that company will vote on reclassifying the present 6 per cent preferred stock, of which $10,000,000 is authorzed, so that $5,451,800 will be 6 per cent preferred stock and $4,548,200 will be 7 per cent preferred stock. The amount of common stock is to remain at $10,000,000. All preferred stock dividends are to be cumulative and save as to the rate of dividends, both classes of preferred stock are to have identical preferences and voting powers.

It is explained that during the past four years the company has more than doubled its gross earnings. Also during this period more than $7,900,000 has been expended in enlargements and improvements. More money is now required for like purposes. The course open to the company is to sell bonds, debentures or stock. As the present 6 per cent preferred stock cannot be sold at a reasonable price the management has decided that it would be advantageous to increase the dividend rate to 7 per cent and put out more stock than to issue debentures or other short-time obligations which would take precedence over the preferred stock and have a fixed maturity. The stock at the price offered will give the purchaser a return of 7.37 per cent. Stockholders are to be offered the opportunity:

1. To subscribe for 7 per cent preferred stock at 95 and dividends. For each share of 7 per cent preferred stock so subscribed, two shares of 6 per cent preferred stock may be exchanged for two shares of 7 per cent preferred stock.
2. To exchange 6 per cent preferred stock for 7 per cent preferred stock without subscribing for 7 per cent preferred stock upon the payment of $10 per share on condition, however, that the holders agree not to sell prior to Jan. 1, 1923, for less than $95 per share the 7 per cent stock so acquired. This requirement is to protect the company's market during the campaign which it proposes to conduct for the purpose of selling preferred stock to customers.

The company will accept payment in installments over a period of eight months.

A Road Without an Owner

The Monterey & Pacific Grove Railway, operating between Monterey and Pacific Grove, Cal., will have to raise $8,000 and be prepared to spend that amount in putting the system in shape, before any relief will be given in the shape of increased fares. This is the order of the Railroad Commission of California issued on April 11, on the application of the utility for authority to increase its charges.

The line was once controlled through stock ownership by the Coast Valleys Gas & Electric Company. The ownership, according to the Coast Valleys company, changed in May 1920, when the stock of the railway was sold at public auction in New York City to L. T. Fetzer. It brought $184. The Coast Valleys Company, however, still owns the carhouse and shops. James S. Pollard, president of the Coast Valleys, says there is no corporate connection between his company and the owner of the railway line.

Neither the New York owners nor the Coast Valleys are willing to assume liability for the railway company's bonded indebtedness or other debts. At the public hearing on the matter held by the commission the local manager of the road was asked if he or some other authority would make available a few hundred dollars necessary to make urgent track repairs.

"There is no such authority," he answered.

The commission is satisfied that the local management is capable, but it says the needed cash must be placed at his disposal before higher fares will be considered. Investigation by the commission shows that there is outstanding common stock of the par value of $300,000 and $270,000 of bonds. The total investment in road and equipment, as shown by the company's last annual report, December, 1920, is $612,833. Against these figures the commission's engineers find a reproduction cost of $132,488 and a depreciated reproduction cost of $73,214.

Bond May Remove Need for Receivers Acting

Action taken by Homer Hennegar, judge of the Tippecanoe County Circuit Court at Lafayette, Ind., in the appointment of receivers for the Lafayette Service Company, was suspended recently when the defendant company filed an appeal bond in the sum of $75,000. In consequence the local railway is again placed in the control of the Lafayette Service Company and Edward M. Watson and Frank Scott, receivers, are relieved of their duty until the Supreme Court of Indiana rules on the appeal.

Mr. Watson and Mr. Scott recently took over the management of the railway as receivers following proceedings instituted by a local property owner, who alleged that by reason of the company's failure to relay tracks and resume service on East Main Street his property there had been damaged.

A special attorney for the city asked that the appointment of a receiver be delayed in the interest of the Eastern bondholders. The court refused to defer action and said that the receivers would be empowered by the court to proceed with the relaying of the East Main Street track and make other needed repairs. The railway attorneys gave notice of appeal.

It is said that the attorney of the bondholders made a statement at the hearing on the petition for a receiver that the line would be improved generally and the Oakland Hill line rebuilt, and that six new one-man cars would be put in operation in Lafayette by Sept. 1. The filing of the bond will now afford the company an opportunity of carrying out these suggestions of the attorney.

Cheerful News—Seattle Has a Surplus

If Seattle can keep up the pace of earnings established by the Municipal Railway in March then two years hence the present cash deficit in the operation of the road may be wiped out. This is the assumption based on the surplus of $18,538 shown for that month. Mayor Caldwell has never waxed very enthusiastic about the Municipal Railway, but he is cheered by the change from red to black in the statement of earnings. He said:

> The financial report of the Seattle Municipal Street Railway for March, delivered to me by the general superintendent of railways, shows the total revenues $545,382.
>
> This was swelled by some forteen odd thousand dollars received in March for property previously sold, thus swelling the receipts to $564,098.
>
> The total expenses for March were $383,129. To this expense should be added interest on general bonds, $2,979; interest on utility bonds, $68,533; discount on utility bonds, $575; miscellaneous interest (warrants), $1,375; or a total expense for March, exclusive of depreciation, $456,593; to which should be added one-twelfth of the installment of principal due next March, $70,250, or a total expense, including installment of interest and principal of $526,843, with revenues of $545,382, or a surplus of $18,538 to apply on the actual cash deficit or on depreciation charge.
>
> If this basis continues for two years we will be able to wipe out the actual cash deficit. The receipts of the fourteen odd thousand dollars above referred to will also go toward wiping out the actual cash deficit.
>
> The only other full month on the present 8⅓-cent fare is February, with its twenty-eight days. By taking 28-31 of the March revenues of $545,382, we get $492.608, for twenty-eight days as against $492,758, revenues for February, or practically the same.
>
> The total number of passengers of all kinds carried during the thirty-one days in March was 8,398,294 as against 7,523,915 for the twenty-eight days of February and as against 8,466,558 for January, eight days of which were under the 6¼-cent fare. The figures show that Easter Sunday, March 27, there were 237,947 passengers, or 42,000 more than on any other Sunday in the month. Evidently a lot of people go to church once a year.

Service Resumed by Commission Order

Public Service Commissioner Barrett authorized the Brooklyn Rapid Transit Company on April 24 to resume service on the Church Avenue line without transfers. The order followed the enactment of the bill of Assemblyman Walter F. Clayton, under the terms of which the Public Service Commission was granted authority to permit service for a 5-cent fare minus transfers. The original charter of the old Nassau Electric Railroad provided for transfers but Receiver Garrison said the line could not be operated at a profit if the transfer privileges were insisted upon The line has not been running since the strike in August of last year. It carried 1,000,000 passengers a month about 600,000 of whom the company claimed took transfers. The shutting down of the line has been a great inconvenience to the traveling public, the line being the only crosstown line in that section of Brooklyn.

Financial News Notes

Mr. Adair Resigns as Atlanta Director.—Forest Adair has resigned as a director of the Georgia Railway & Power Company, Atlanta, Ga. He has been a director of the company since 1912.

Abandonment Approved.—The Millville (N. J.) Traction Company has been granted permission by the City Commission of Millville to abandon its line in South Millville and the tracks will now be removed.

Rhode Island Company Losing.—In its report for February, 1921, recently submitted the Rhode Island Company, Providence, R. I., failed by $109,141 to meet its fixed charges. This makes a deficit for the first two months of the year of $183,219. The passenger earnings, however, increased $61,827 or 12.5 per cent over the same month a year ago.

Receiver for Austin Street Railway.—William J. Jones, president of the Austin (Tex.) Street Railway, has been appointed receiver of the company on the application of the Rochester Trust Company, Rochester, N. Y. *Moody's* gives the only bonded indebtedness of the company as $780,000 of 6 per cent bonds dated 1911 and due 1936, with the Equitable Trust Company, New York, N. Y., as trustee.

$800,000 Written Off.—In connection with the payment of the dividend for the first quarter of 1921, at the rate of 7 per cent, the Capital Traction Company, Washington, D. C., announced that increased earnings during the last two years have made it possible for the corporation to write off losses of previous years due to the enforced retirement of single-truck cars. Some $800,000 was written off.

Car Trusts Offered. — Alexander Brown & Sons, Baltimore, Md., recently offered for subscription at prices to yield about 8 per cent, according to maturity, $240,000 of 7 per cent car trust bonds of the Annapolis Short Line

Railroad. The bonds are dated Jan. 1, 1921, and are due $24,000 annually from Jan. 1, 1922, to 1931. They are unconditionally guaranteed as to principal and interest by the Washington, Baltimore & Annapolis Electric Railroad.

Sale Decree Filed.—An agreed decree approving the sale of the Gary (Ind.) Connection Railway and the Gary & Valparaiso & Northern Railroad to representatives of the first mortgage bondholders of the two companies was filed with the clerk of the Federal court recently. The object of this suit, it is said, is to enable the first mortgage bondholders to continue the operation of the roads and to clear the bonds and lift the receivership. Actions to declare the roads insolvent were filed in 1918.

Commission Modifies Bond Issue.—An order has been made by the Public Service Commission of Indiana modifying a former order permitting the Indianapolis & Louisville Traction Railway, Scottsburg, Ind., to issue $178,000 of 5 per cent first mortgage bonds, dated April 1, 1912, and maturing in thirty years. The previous order permitted the sale at 80 per cent of par, but the bonds may now be sold at not less than 75 per cent. The proceeds are to be used solely in paying 80 per cent of the cost of improvements and additions made between June 16, 1919, and Sept. 20, 1920. The company has been absorbed by the Interstate Public Service Company, Indianapolis, Ind.

Limit to Indebtedness Removed.—The limit of indebtedness of the Minneapolis Street Railway, which has been $1,200,000, has been removed by an amendment to its articles, filed with the Secretary of State. The directors voted a resolution which reads: "Whereas it is deemed advisable by said Minneapolis Street Railway that said limitation of indebtedness or liability be removed, now, therefore, be it resolved that Article 4, limiting indebtedness and liability to $1,200,000, be and the same hereby is amended to read as follows, to wit: "The amount of indebtedness or liability to which said corporation shall at any time be subject shall not be limited."

B. R. T. Wants Transfer Points Discontinued. — Although Public Service Commissioner Barrett has approved the application of three companies at present under the receivership of Lindley M. Garrison to resume experimental operation on a part of the Park Slope line the Brooklyn Rapid Transit Company, Brooklyn, N. Y., has refused to put its own plan into effect. A new condition for restoring service in that section is that the Public Service Commission should permit the discontinuance of the 2-cent transfer at thirty-six other points in the borough. Service on the Park Slope line has been suspended since Jan. 13. The operating companies promised resumption if the route were made shorter. When the commission did not approve of shortening the route service was abandoned.

Hartford Lines Doing Well.—President Lucius S. Storrs of the Connecticut Company said at a recent hearing before a committee of the Legislature at Hartford that the 10-cent fare—raised from 7 cents on Nov. 1, 1920—has been very successful from a financial standpoint. The Connecticut Company's local charter requires the payment to the City of Hartford of 2 per cent of gross receipts. This amounted to $34,283 on an income of $1,714,176 in 1919 and $42,883 in 1920, when the gross receipts were $2,144,194. Thus there has been an increase in income on Hartford lines of $430,017 in the past year. In Hartford jitneys were eliminated by means of a city ordinance, so that the company is free from competition that has grown to serious proportions in other cities in which the Connecticut Company operates.

$15,000 Voted for San Francisco Appraisal.—At a meeting of the public utilities committee of the Board of Supervisors of San Francisco, Cal., on April 13, it was voted to recommend that the finance committee provide $15,000 for the city engineer's appraisement of the properties of the United Railroads and to fix a valuation at which San Francisco can acquire the system by paying for the property out of the earnings of the railway without a bond issue. According to Amendment 30, carried by a 30,000 majority on the November, 1920, ballot, an enabling act was approved providing for the purchase of public utilities on a "pay-as-you-go" basis. It is expected that a proposal for the purchase will be placed on the ballot at the general election in November.

$221,786 Surplus at Richmond.—Incident to changing its year from June 30 to the calendar year stockholders of the Virginia Railway & Power Company, Richmond, Va., met on April 21. Only routine matters were discussed and the present directors and officers were re-elected. The statement of earnings and expenses of the company compiled for the system for the six months ended Dec. 31, 1920, showed the total gross earnings to be $5,779,545, an increase of $987,494 over the same period of 1919. Operating expenses totaled $4,280,682, an increase of $1,074,314 over the same period of 1919. Taxes and licenses paid by the company for the six months amounted to $354,701, an increase of $28,339. The surplus over fixed and all other charges, including depreciation, for the entire operations for the period was $221,786.

Dallas Steadily Going Behind.—A detailed statement of operating costs and revenues for the thirty-nine months of its operation under the present franchise was presented by the Dallas (Tex.) Railway before the Board of City Commissioners in the fare hearings now being conducted on the company's application for a 7-cent fare. The operating statement shows that the company incurred a deficit of $651,374 between Oct. 1, 1917, and Dec. 31, 1920, and that the return realized for the first three months of 1917 was 4.55 per cent; in 1918, 3.75; in 1919, 5.09, and 1920, 4.87. The return for the operation of the terminal for these periods was somewhat less. The pay of platform men has increased 113 per cent since 1915, according to figures in the statement. The property value of the company has increased from $7,662,069, to $9,317,813 in the last three years. The original valuation was agreed upon when the franchise was granted and each addition has been made in accordance with the terms of the franchise and on authority of the Supervisor of Public Utilities.

Even Electric Railway at Miami Prospered.—The wealth of the world goes to Miami, Fla. Moreover, the wealthy don't all ride around in the lap of luxury in their own Packards or Rolls Royces. Not at all. Proof of this is available. Look at the Miami Beach Electric Company's record. Bringing the total number of passengers for the season up to more than a quarter millon—263,165 to be exact—the Miami-Beach Electric Company, Miami to Miami Beach, Fla., hauled 80,166 passengers during the month of March, according to figures announced by Manager Ellis. Then, too, the company paid the county of Dade, which built the causeway the electric company uses, $1,101.16 during the month. This represents 1⅜ cents for each passenger that crossed the causeway by trolley. Mr. Ellis now proposes to take up with the county commissioners the question of building four switches, 300 ft. long, two of which have to be built on the causeway, so as to permit a ten-minute schedule between Miami and Miami Beach.

Protective Committee Recommends Refunding.—Owing to the continuation of the receivership of the Birmingham Railway, Light & Power Company, Birmingham, Ala., the company found it impossible to pay off the $1,200,000 of 6 per cent two-year gold notes which fell due on April 1. The notes originally came due on April 1, 1919, but were extended to April 1, 1921, at 7 per cent. The protective committee representing the noteholders has entered into a tentative agreement with representatives of the owners of the equity of the property, under which it is proposed to issue to the depositing noteholders general and refunding mortgage twenty-year 8 per cent bonds, Series A, par for par. In addition the company proposes to use the proceeds of $800,000 of general and refunding mortgage twenty-year, Series B, 8 per cent bonds, together with cash from the sale of securities junior to these bonds, to reduce the floating debt to an amount not to exceed $450,000. Failure on the part of the committee to deliver 85 per cent of the outstanding notes for exchange will defeat the plan. At the time the proposal for the exchange was made to the security holders there were on deposit with the committee $1,197,000, par value, out of the $1,200,000 total of notes outstanding.

Traffic and Transportation

Eight-Cent Fare Still

Court Restrains City of New Orleans from Reducing Fare of Railway in Receivership

Judge Henry D. Clayton, Montgomery, Ala., presiding in the Federal District Court at New Orleans, La., in lieu of Judge Rufus E. Foster, who excused himself at the suggestion of the officials of the city government, has sustained the contention of the New Orleans Railway & Light Company and granted the company a temporary injunction restraining the city from interfering with the operation of cars there or changing the rate of fare, fixed by the court at 8 cents.

An ordinance adopted by the city placed the rate of fare at 7½ cents. This rate of 7½ cents Judge Foster refused to approve. Moreover, Receiver O'Keefe, of the railway, refused to put the new rate in force under the ruling of the court. The city has two weeks to answer the temporary injunction and City Attorney Ivy G. Kittredge and his assistants are now engaged in preparing the city's defense against a permanent injunction.

The people have taken the decision uncomplainingly, but not so the city officials. It is the belief of Commissioner Maloney, of the Public Utilities Commission, that the ruling of the court paves the way for an ultimate fare of 10 cents. He bases his opinion upon the ruling of the court which restrains the city from interfering with the 8-cent fare or any other rate of fare which the federal court and the receiver of the company may determine as necessary to give a fair return upon the valuation of the property.

From figures taken from the petition of the railway and reports of the business transacted by the company during the first two months of 1921 Commissioner Maloney draws the conclusion that there will be a difference of $1,425,549 between the 3.1 per cent earned at present and the 8 per cent return petitioned for. With reference to this matter Mr. Maloney says:

> From the petition of the receiver it is noted that the alleged value of the railway property is given at $29,400,000 and that the rate of return he asks is 8 per cent.
>
> During the first two months of this year the system earned a net return of 3.1 per cent. He asks the court for such other fare as the court may find necessary to enable the payment of all operating expenses, the usual reserve and a "fair return" on the valuation of the property.
>
> The city is enjoined from interfering with the 8-cent fare or the other fare that the court may fix.
>
> On the basis of 110,000,000 passengers carried yearly an increase of 1.3 cents per passenger would be required. Interest on the new money would call for an additional increase bringing the total fare up to about 10 cents.

There is talk on the part of representatives of the city of permitting the jitneys to return.

It is reliably reported that a representative of the Eastern investment bankers, now on his way to New York, called on Commissioner Maloney to learn his final stand on the matter and that nothing will be done until word is received from this representative.

Bus Regulation May Go to a Vote

The old traction fight at Toledo, Ohio, will again be brought before the people at an election this fall through the filing of a referendum on the bus regulatory ordinance passed by Council a month ago. It had been proposed to put the ordinance into effect on April 21. It provided for tax of from $25 to $100 for each vehicle and required the bus owner to furnish bond from $5,000 to $10,000 depending upon carrying capacity.

The measure was counted upon to put the bus business on a fair competitive basis with the cars of the Community Traction Company, and it was thought it would divert between $500 and $1,000 a day to the railway system. Street Railway Commissioner Wilfred E. Cann and city officials favored the regulation of the buses. They will probably make an active fight before the people for passage of the ordinance.

Progress is reported on the fixing of a fair rate for power to be charged by the Toledo Railways & Light Company for the operation of the traction lines. David Friday, Ann Arbor, economist, and V. B. Phillips, Cleveland, consulting engineer, have been retained by the city to fix the charge for this service.

Five-Cent Fare Lines Planned in Medford

The trustees of the Boston (Mass.) Elevated Railway have authorized the extension of the 5-cent fare for local riders to six lines operating in Medford and part of Somerville to the Sullivan Square terminal of the main rapid transit line. As in the case of the 5-cent fare service in Malden and Everett, started recently, a fare of 5 cents will be charged for a local trip without transfer by means of payment to the conductor on the car, while a 10-cent fare will be charged if the passenger continues his ride on the rapid transit line to Boston. A local crosstown service will also be started in this community, operated with one-man cars, on a 5-cent fare basis.

No date has been set for commencing this service, but it will be undertaken as soon as the necessary arrangements can be made for the collection of 10-cent fares from inbound passengers arriving at the Sullivan Square Terminal on these lines.

Railway Protest Unavailing

Autos to Compete with Bamberger Electric—Commission Must Not Bar Progress

An automobile stage line is to be operated between Salt Lake and Ogden, Utah, a certificate of convenience and necessity having been issued by the Public Utilities Commission of Utah, after a hearing on the application for the permit of Bruce Wedgwood and Fred A. Boyd.

The application of Wedgwood and Boyd was contested by the Bamberger Electric Railroad and the Oregon Short Line Railroad, on the ground that they are prepared and ready to give adequate freight service, by means of equipment and rights-of-way obtained at a huge expense, and that there is no public necessity or convenience to be served by the new method of transportation that they cannot serve or are not willing to serve. They further set up that the proceeds of the taxes they pay go in part to the construction and maintenance of the highways. The applicants, it was pointed out, would operate over these highways, without contributing anything to their construction or maintenance.

CLAIMS OF THE TRUCK OPERATORS

On the other hand the operators of the truck service contended that they are able to give a superior service, one that would be speedier in its operation, and would also require the handling of the goods fewer times. The commission yielded to this argument, but in deciding that service may be established also sets up some conditions.

In its decision the commission said in part:

> The applicants must furnish stations, warehouses and persons to take charge of and keep, with reasonable safety, the freight intrusted to their care. There must likewise be an assurance that the parties giving service will be able to furnish sufficient rolling stock to take care of the business. Such direct handling and hauling of freight would clearly indicate that a service would be rendered that would be more convenient and direct than is given by the railroads.
>
> The commission should not attempt to bar progress. The power vested in the commission is intended to be constructive, not repressive. The public is entitled to the best service possible to be given, and to the freest utilization of valuable new inventions. If the motor truck can demonstrate its superiority over the railroad for the transportation of short-haul freight, and if by its use economy of time or money is effected, public convenience and necessity will require its being brought into service, and ultimately it will be used, with or without sanction.
>
> Even now trucks are carrying great quantities of freight over the route in question here. This is being done under private contract, which places the service outside the range of regulatory law. If this petition is granted it is probable that much of this traffic will come under control, and rates and service will be stabilized and made more satisfactory and dependable every way to the shipping public than it now is under private contract operation.

The order requires the publishing of schedules of rates and fares and of arriving and leaving time at the various stations to be served by the new service. It is effective on due notice to the commission and the public, which means thirty days after filing with the commission.

San Antonio Decision Prompts Filing of Supplementary Brief

Recent decisions of the United States Supreme Court in public utilities rate cases, especially the case in favor of the electric railway at San Antonio, have prompted Churchill Humphrey, attorney for the Louisville (Ky.) Railway, to file a supplemental brief in the United States District Court of Appeals at Cincinnati, claiming that the litigation now pending between the Louisville Railway and the city of Louisville in the Federal Courts is analogous to the conditions governing the San Antonio case.

Mr. Humphrey holds that the two cases are alike in that the city of Louisville is without legislative authority to enter into an irrevocable contract with the company, since by so doing it would lose its right to regulate the operation of the railway system.

A Dead Cow Is Worth More Than a Live One

A combination of paris green to turn the grass brown and the free-range law in Florida have just cost the Tampa Electric Company $11,000 — for the usual array of registered cattle that always bobs up where only the tick-infested breed sprung before the railroad knocked 'em over, or in this case the railway poisoned them.

In an endeavor to eradicate weeds and grass growing between its tracks on the suburban line to Port Tampa the Tampa Electric Company sprinkled the way with a solution of paris green. During the night the "sacred" cows of folks along the line and in Port Tampa indulged freely of the grass and weeds and a total of 102 died within the succeeding ten days. Of course they all died from the poisoned grass. When it came time to settle the cows came high. The owners even refused to allow for the hide and collected in a total, more than $11,000 according to T. J. Hanlon, Jr., general manager.

The Tampa *Tribune*, waging a fight for a No-Fence law abolishing free range, seized upon the incident to show passengers one of the reasons why railroad rates and trolley rates seem high —because the public must foot the bill for such follies as free range.

Railway May Take Over Jitneys

The possibility was discussed of bringing the entire transportation facilities of Muskegon, Mich., and surrounding community under the ownership of the Muskegon Traction and Lighting Company and under control of proper, publicly constituted authority at a hearing recently conducted by the Michigan Public Utilities Commission.

A joint committee representing the various interests of the community was named to compile a definite report as to the possibility of the traction company buying the bus equipment now in use, and to gather all other necessary data relative to a revolutionary move of this kind.

If the traction company finds it possible to finance such an undertaking it appears likely the committee will recommend that this solution of the present and long-standing problem be adopted.

President George Steinwedell said he would take the matter up with the company at once and would know in a short time if it would be possible for the company to purchase the jitneys, which have a present value of about $50,000.

East St. Louis-St. Louis Rates Upheld

The Interstate Commerce Commission has dismissed the complaint of the Greater Belleville Board of Trade against the fares on the East St. Louis & Suburban Railroad for the transportation of passengers from Belleville and East St. Louis, Ill., to St. Louis, Mo., finding them not unreasonable, unduly prejudicial, or otherwise unlawful. It was charged that the railway had not only increased materially the interstate fares previously in effect, but had changed the basis of such fares by establishing various fare groups or zones.

The complaints further stated that the fares assailed materially exceeded the one-way and commutation fares previously in effect, and that the time within which commutation fares could be used had been reduced from sixty days to a calendar month. They contended also that the present fares were unreasonably high, distances considered, in comparison with fares in effect over defendants' city line, and that the disruption of long-existing fare groups retarded the development of these communities, and imposed an undue burden upon their inhabitants.

Witnesses for the railroad testified that electric interurban lines generally throughout that section were charging 3 cents per mile, having obtained injunctions from the federal courts wherever the provisions of state statutes were contravened. They showed that the fares on the Belleville division had been maintained on a lower basis than those applying over their other interurban lines. The former, as increased on the dates previously mentioned, average slightly more than 2 cents a mile from Belleville to St. Louis, and a fraction under 2 cents to East St. Louis, whereas the latter were increased at the same time to 3 cents per mile. The travel over the other divisions is not as heavy as over the Belleville division, but the witnesses for the company said that due consideration has been given to this factor.

"Tokens" for Convenience and Economy.—The Peoria (Ill.) Railway is using "Tokens" exclusively on its city lines at the rate of two for 15 cents or in multiples of 15 cents. The cash fare in Peoria is 8 cents.

Retention of Five-Cent Fare Recommended

City Attorney, Robert L. Shinn, of Sacramento, Cal., recently received a report from the California Railroad Commission offering recommendations for the operation of the Pacific Gas & Electric Company "with increased revenue without sacrificing service." Among the suggestions are the following:

A continuation of the present 5-cent fare.

The installation of thirty-six new one-man cars.

The construction of a loop at the Southern Pacific station.

The elimination of duplications of service at a saving of $29,000 for the year.

The continuation of bus service.

In the matter of continuing the present 5-cent fare, which was the point at issue when the Pacific Gas & Electric Company sought the survey, the elimination of coupon books is suggested, thus making all regular fares 5 cents. It is also recommended that a full half fare be charged school children and that all free transportation except to those in the transportation department be denied. Commissioner D. N. Carmichael has stated that he is willing to carry out the recommendations of the State Railroad Commission if the company will assist the city.

Civic Bodies After Des Moines Jitneys

The two leading business men's organizations and the women's club took a hand during the week ended April 16, in an effort to help bring order out of chaos in the Des Moines City Railway-City Council-jitney controversy. The Greater Des Moines Committee and the Chamber of Commerce each chose committees to make it their special business to help solve the problem, while the women's club adopted resolutions urging elimination of the buses.

A meeting of the two committees named by the commercial organizations with members of the City Council, representatives of the street railway employees unions and officials of the Des Moines City Railway was set for April 18 and it was the hope of the civic organizations that some tangible good would result.

In its preliminary work the committee of the Chamber of Commerce offered three possible suggestions:

1. Abrogation of the present working agreement between the company and its trainmen, and placing the men on an open shop basis.
2. Elimination of the buses from the streets on which street cars operate.
3. Reduction of the fare from 8 cents to 6 cents.

According to the terms of the Lake jitney bus bill, passed at the recent session of the Iowa Legislature, councils of Iowa cities may by vote restrict the operation of jitney buses to streets which are not occupied by electric railway tracks. This law will give the City Council of Des Moines a chance to rid the city of the buses in case a settlement is made of the street railway question.

Prefer 10-Cent Fare to Zone System

The Massachusetts Department of Public Utilities has announced a public hearing to be held on May 4 in Boston, on the petition of eleven cities and towns served by the Worcester Consolidated Street Railway for a revision of the suburban zone fare system now in effect. The petitioners protest the 7-cent zones and request a return to the old fare limits, generally speaking the boundaries of cities and towns, a 10-cent flat fare being suggested. The city of Worcester is not included in this matter, a 10-cent fare having been established there on Feb. 6 by order of the Department of Public Utilities. It was at that time that the fare on the suburban line zones was increased from 6 to 7 cents per zone, this increase having lead the suburban patrons to petition for a flat 10-cent fare in preference to the short zone system and 7-cent rate.

Transportation News Notes

One-Man Cars for Entire System.—The Madison (Wis.) Railways has petitioned the Railroad Commission for permission to equip its entire system with one-man cars.

Ten-Cent Fare in Effect.—The New Jersey & Pennsylvania Traction Company, Trenton, N. J., is now charging a 10-cent fare on its Pennsylvania divisions running out of Trenton, the increase having been allowed by the Public Service Commission of Pennsylvania. The company had been charging 8 cents.

Eight Cents in Scranton.—Under an order recently handed down by the Pennsylvania Public Service Commission the Scranton Railway is authorized to collect an 8-cent cash fare upon thirty days' notice, with four tickets for 30 cents. The present rate is 7 cents, with four tickets for 25 cents. At the expiration of a year, during which time the new rate will be in effect, the commission will review the railway finances and give a new finding.

Ten Cents in Alton. — An increase from 8 cents to 10 cents in fare on the Alton lines of the Alton, Granite City & St. Louis Traction Company has gone into effect. The rate between Venice and Brooklyn has also been raised from 8 cents to 10 cents, with tickets at five for 40 cents. Federal Judge English has granted an injunction restraining Illinois authorities from interfering in the fare adjustment by the company, which is in the hands of federal receivers.

Galveston Railway Gets New Hearing.—Judge Hutcheson recently granted the motion asked by counsel for the Galveston (Tex.) Electric Company for a new hearing, after having recently decided the case in favor of the City of Galveston in denying an injunction against the enforcement of the 5-cent fare ordinance. The court indicated that more information on the cost of maintenance and depreciation will be forthcoming through the appointment of a special engineer by the court for investigation of the costs.

Ten-Cent Fare Denied.—The Board of Public Utility Commissioners of New Jersey has declined to consider an application of the Jersey Central Traction Company for permission to increase fares on all its lines from 7 to 10 cents, pending action by the State Supreme Court on an appeal from a ruling of the old board which rejected a similar application. The application was based on a statement that under the present tariffs the company has lost money steadily and will be forced into the hands of a receiver unless relieved.

Recommendation Reported Incorrect.—H. C. Eddy, street railway engineer of the Board of Public Utility Commissioners of New Jersey, denies that the recommendation was his that patrons of the Trenton & Mercer County Traction Company, Trenton, N. J., be required to have the exact fare ready when they board the cars or be made to pay 10 cents for a ride. Reference to this recommendation was contained in an item entitled "Commission Inspector Reports on Crowding," which appeared in the ELECTRIC RAILWAY JOURNAL for April 9.

Eight Cents in Cedar Falls.—Fares in Cedar Falls, Iowa, were increased from 7 cents to 8 cents on April 1. This change is in accordance with an agreement made between General Manager Cass of the Waterloo-Cedar Falls Northern Railway, Waterloo, Iowa, and the City Council that the company could advance the rate if after operating for a month under the 7-cent fare the revenue was found to be less than the average monthly revenue derived from the 10-cent rate which had been in existence for the five months previous. A statement issued from the offices of the company's auditor shows that there has been a decrease of 15.3 per cent as compared to the average daily receipts for the five months previous.

Fares Lowered in Rockford. — The Rockford and Interurban Company, Rockford, Ill., has lowered cash fares from 10 cents to 8 cents within the city limits of Rockford. The company has been charging 10 cents since March 1, 1921, and the new fare became effective April 1. The rate of cash fare is the same on both interurban and city cars within the corporate limits. The decision of the company to reduce the fare 2 cents was reached following complaints of Rock View residents, who objected to paying 10 cents, inasmuch as they live adjacent to the Elgin and Belvidere Electric Company and the Fifth Avenue cars of the City Traction Company of Rockford, both of which now charge 8 cents. All cash fares are now equal.

Reasons for Fare Increase Explained.—Increases granted to the Orem Electric Railroad, Salt Lake City, Utah, in passenger fares are not for the purpose of paying dividends, according to W. C. Orem, president of the company. To make this plain Mr. Orem has had prepared a number of bulletins for display in all of the waiting rooms of the company. The bulletins set forth the amount of increases allowed, which is from 3 cents to 3.6 cents a mile for one-way, with 180 per cent of the one-way fare for the round trip. The former fares for round trips were 190 per cent of the one-way fare. Commutation and school tickets have not been increased in price. Following this citation of fares is a statement that the increased revenues are for the purpose of meeting increased wages, high cost of materials, higher taxes, and interest on money borrowed.

Two Zones Instead of Three.—The Public Utilities Commission of Utah has rendered a decision establishing two zones on the Holliday line of the Utah Light & Traction Company instead of the three which have prevailed in the past. The order is issued as a result of a petition filed by patrons of the line alleging that the three-fare rate was discriminatory and had held back the settlement of the southeastern territory served by the railway. The complainants further alleged that the three-fare system worked an injustice on the traveling public and especially children attending school in Salt Lake. In answer the Utah Light & Traction Company alleged that the fares were just, in that the territory served is sparsely settled, and that the three-fare rate was necessary to produce adequate revenue. The new two-fare system became effective on April 6.

Fares Changed at Columbia.—The Columbia Railway, Gas & Electric Company, Columbia, S. C., discontinued the use of free transfers on Feb. 14, putting into effect on that date exchange tickets at a price of 3 cents each. In other words, the company installed the same kind of system that has been in use by the Philadelphia Rapid Transit Company for some time. The company has since applied to the Railroad Commission for permission to increase the fare from Columbia to Camp Jackson. Ever since the construction of the Camp Jackson line in 1917 it has charged 10 cents, or 5 cents for each zone, the line having two zones. The soldiers were given the benefit of the reduced rate by charging them 15 cents for the round trip when they purchased tickets at the camp exchange. If the company secures permission from the Railroad Commission to charge 7 cents in each zone, the special rate to soldiers will be discontinued and they will be required to pay the same rate of fare as civilians.

Personal Mention

Railwayman President

J. W. Shartel, Oklahoma Railways, Elected to Presidency of State Utilities Association

John W. Shartel has been re-elected to the presidency of the Oklahoma Utilities Association, the precedent of a single term for this office having been abandoned. Mr. Shartel is one of the pioneer electric railway builders of that state. He organized and built in 1902 the Oklahoma Electric Railway, Oklahoma City, Okla., of which he is now vice-president and general manager.

By virtue of the keen and farsighted policy of Mr. Shartel in providing abundant transportation facilities it has been possible for Oklahoma City to grow from a town of 15,000 to a city of 100,000 population in the brief period of about twenty years. The company has been liberal, almost to the extent of being radical, in building new lines through unsettled districts awaiting developments and has successfully carried a large percentage of unproductive mileage until the time when the volume of traffic became sufficient to make it self-supporting.

At the time the undertaking was started, the communities all being small, the street extensions were laid out with private rights-of-way in the center for car tracks, with the result that more than 110 miles of the 145 miles comprising the interurban and city systems are now on private rights-of-way. In advance of the growth of the city the rights-of-way procured for high-speed entrances for interurban cars into the centers of all cities are without grade crossings at either highway or railway. The company has acquired approximately 100,000 sq.ft. of valuable land leading into the heart of the city, where its present terminals are located and where it contracts all its interurban and city transfer business.

The growth of the property has been remarkable. It has been the product of a single mind from its inception to completion and has involved no loss by changes or reconstruction. Notwithstanding high war-time prices and conditions generally adverse to electric railways it has successfully withstood every strain and is now in a prosperous and flourishing condition.

Mr. Shartel was born in Harmonsburg, Pa., on May 1, 1862. Soon after his parents moved to Missouri, where he received his early education in the county schools. He was graduated from Kansas Agricultural College, Manhattan, Kan., in 1884. After leaving college he went to Topka, Kan., and studied law. Having been admitted to the bar in 1885 he practiced law in Topeka for a year and then went to Sedan, Kan. After serving three years there as county attorney in 1890 he formed a partnership with W. C. Hackney, and practiced at Winfield, Kan., until Jan. 1, 1893, when he moved to Guthrie, Okla., where the firm of Asp, Shartel & Cottingham was formed.

In 1898 Mr. Shartel came to Oklahoma City and became general attorney for the Choctaw, Oklahoma & Gulf Railroad, which position he held until 1901. Several years later he formed a law partnership with J. R. Keaton and Frank Wells, which continued until 1912, when he retired in order to devote his time to the Oklahoma Electric Railway, which he organized in 1902 and which had grown to such proportions that it required the greater part of his time.

J. W. SHARTEL

Obituary

Z. V. Taylor Dead

Z. V. Taylor, president of the Piedmont & Northern Railway, Charlotte, N. C., and president of the Southern Public Utilities Company, which operates street railway systems and other utilities in Charlotte and Winston-Salem, N. C., and Greenville and Anderson, S. C., died suddenly on the private car of J. B. Duke while en route from Charlotte to New York.

Mr. Taylor was active in the promotion of the Piedmont & Northern Railway, which was organized in 1912. The rapid growth of the road is shown by the fact that it now operates over 127 miles of track. At the time of his death Mr. Taylor was about to make extensions to the road, which had been blocked by the government's taking over the system in 1916.

The public has best understood his identity with the Southern Power Company as president of the Public Utilities Company and as president of its interurban lines. His spirit and energy permeated all branches of that organization. Perhaps the greatest business tribute paid to him was that shown eleven years ago when the Southern Power Company wanted a fair, diplomatic and astute man to give advice on those problems which confront a fast-growing corporation. He was chosen and secured for his company by winning words and a just, legal show of the facts, privileges and franchise concessions that made his services of great value.

It was in 1910 that Mr. Taylor, then head of the Greensboro Traction Company, was recognized by larger interests as a man whose ability was needed to help develop what later became the Southern Power Company. After three years at this work he and his associates formed the organization of the Southern Public Utilities Company, uniting electric and railway interests in four or five of the largest cities in North and South Carolina.

The stamina which Mr. Taylor had been able to inject into this merger of big concerns went far to make the company a success, and though tried at periods by business depressions it has never been threatened with a serious difficulty.

Mr. Taylor was born in Sparta, Tenn., in 1868. His early training was in the public schools of Oak Ridge, but later he carried on his education without school aid. He next read law under Judge W. P. Bynum at Greensboro, with whom he later formed a law partnership.

Arthur Busse, chief engineer of way and structure of the Great Berlin Street Railway, is dead. Mr. Busse was recognized as the greatest authority on track on the Continent and also was always interested and thoroughly familiar with American practices. During the last two years he had been in such poor health that he had retired from active operating duties, but his ardor for his work remained with him to the end. He was a great admirer of Theodore Roosevelt, whom he strikingly resembled.

J. Henry Meyer, president of the California Street Cable Railroad Company, San Francisco, Cal., and a director in nearly a score of large western firms, died on March 30. Death came after several months' illness. He was a native of Sacramento and sixty-six years old. As the business executive of Antoine Borel, a leading financier in San Francisco's early days, and later as an independent banker, Mr. Meyer exercised great influence in the development of the street railways in San Francisco and the street railway system in Los Angeles. Other firms thrived notably under his guidance. At the time of his death he was interested in many banking, realty and public utility companies.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Price of Trolley and Bell Cord Again Reduced

Reductions the Middle of This Month Made in Effort to Stimulate Buying —Stocks Are Curtailed

In an apparent effort to stimulate buying producers of trolley and bell cord have made further price reductions, effective April 13 and 18 in different instances. The price of cotton has been about holding its own for a considerable length of time now so the cost of material is no lower. At this writing spot cotton is quoted at 12.30 cents per pound, New York. Buying shows no improvement and producers are keeping their stocks low, though deliveries are made promptly.

The following prices are now in effect, the range representing the spread between different manufacturer's prices, and the quantity being in each case coil lots or 1,200 ft.: Bell and register cord, mahogany No. 6, 73 to 76 cents per lb.; No. 8, 70 to 73 cents; drab No. 6, 68 to 70 cents; No. 8, 65 to 67 cents; trolley cord, best grade sizes 8 to 12, 59 to 61 cents. Cheaper grades of waterproof trolley cord can be obtained at 51 cents per lb. and at 33 cents per lb., sizes 8 to 12. Mahogany trolley cord with a wire center is quoted by a leading producer at $22 per 1,000 ft. for No. 6 and $27, for No. 8 in coil lots.

Scrap Steel Market Declines During Past Month

Under Prevailing Prices Dealers Are More Anxious to Buy than Holders to Sell—Railroads Withdraw Lists

During the past thirty days prices of scrap iron and steel materials have been forced still lower than the prices quoted the last of March. Machine shop turnings have shown no change, holding at 5½ to 6 cents in net tons at Chicago, but other materials have receded from ½ cent to 2½ cents.

Prices quoted at Chicago now, in net tons, show No. 1 cast to be off ½ cent to 14-14½ cents; No. 1 R.R. wrought is down one cent to 10½-11 cents; No. 2 is down a cent to 9½-10 cents. Steel springs show a 1½-cent drop to 12-12½ cents; old steel axles have come down ½ cent to 14-14½ cents, while old iron axles have dropped 2½ cents to 24-25 cents.

For gross ton lots at Chicago, quotations are off one-half cent on car wheels to 13½-14 cents; R.R. malleable is lower by three-quarters cent to 14.75-15.25 cents and frogs, switches and guards have dropped one cent to 11-11½ cents. In the rails, old iron rails fell one-half cent to 17-17½ cents, old steel shorts fell one cent to 12-12½ cents and rerolling steel rails are lowered one and one-half cents to 11½-12 cents.

With these so-called low prices ruling at which dealers will consider buying, sellers are not anxious to get rid of their scrap as there is a feeling that an upward turn in the market is not far distant. Many buyers, on the other hand, are taking lots here and there in anticipation of a rise in market. Some railroads which had placed lists of scrap materials in the market have withdrawn these lists on hearing of the prices prevailing. Still other lists have gone through. Although buying has been light there is a better feeling in the trade since the leveling of steel prices two weeks ago. There is a reported scarcity in New York of steel car axles.

Asphalt About $8 per Ton Lower than 1920 Peak

Producers Feel that Quotations Are Close to Bottom—Good Stocks Are Held with Prompt Shipments

Prices of asphalt have hit bottom, according to the view of representative producers. The market on natural asphalt delivered hot in tank boats ranges from $33 to $35 per ton and for asphalt delivered cold in barrels from $33 to $36 per ton. On Mexican asphalt the quoted price in a representative instance is $22 per ton f.o.b. plant. The above prices represent decided reductions from the peak prices of 1920, which on natural asphalt ranged from $41 to $44 per ton. Prices have now held steady for nearly two months.

Stocks of the finished product with producers are fairly large, too much so in some instances. As a consequence immediate deliveries are generally quoted. Shipments of the raw product are prompt, the shortage which was existent last year under transportation difficulties having disappeared. Crude asphalt prices have declined somewhat as reflected in the finished product.

The volume of buying on the part of electric railways this spring has been below the level of other years, though in certain large communities there is a fair amount of activity. Demand on the part of municipalities for paving work of course represents the bulk of the buying, but the present year apparently will not quite come up to normal in that quarter either. There is a distinct tendency to hold off on making purchases and on that account producers expect business to improve this summer.

Lower Prices on Tubular Steel Poles

Recent Reduction in Steel Anticipated in Pole Prices Though Little Increased Buying Has Resulted

Inquiries in the market for tubular steel poles are numerous, it is stated, but there have been very few actual orders placed by electric railways this year. There has been some buying of combination railway and lighting poles, however, the main factor there being the insistence of merchants and municipalities that these orders be placed so as not to delay street improvement work. Several large railways have made inquiries covering their year's requirements on poles, but reluctance to buy has generally been shown because of expectations of price reductions.

In this connection an attempt has been made to check up the effect which recent price reductions on standard pipe and other steel products by the Corporation may have had upon tubular pole prices. One of the leading interests in this market states that it does not always follow that a reduction in standard pipe prices affects the selling price of poles, as on the latter product each sale is a transaction by itself so far as delivery and price is concerned. The price question in this instance is therefore left unanswered. Another large producer, however, made a decrease of $15 per ton on steel poles during February, and this cut, it is stated, more than anticipated the recent drop in the price of pipe of which poles are made. Therefore no additional reduction is contemplated from this source before the beginning of the third quarter, and no decrease will be made then unless steel prices undergo another decline.

Although present deliveries in this line are good, with shipments ranging from sixty to ninety days, prospects for improved buying are uncertain, according to producers. The view is expressed that electric railways will hardly purchase poles this year unless forced to do so by franchise conditions or extensions ordered by city councils.

Austria Asks for Car Bids in this Country

The United States Bureau of Foreign and Domestic Commerce, Washington, D. C., reports that quotations by cable are requested from Austria for twenty-four street cars, of which twelve are to be equipped with motors and twelve are to be operated as trailers. Seating capacity of the cars is to be sixteen persons, with standing room on the front platform for eight people and on the rear platform for ten. The distance between the rails is 1,445 millimeters and between the wheels 1,440 millimeters. Further information about the cars, which it is stated are urgently needed, can be obtained from the bureau or its district offices by mentioning 34,743 as a reference number.

Stranded Steel Wire Prices Follow Steel Down

Shipments Maintaining an Even Pace, but There Is Only a Small Volume of Orders

Activity in the market for stranded steel wire is not very marked at present. New construction work is not large in any field apparently, at least the volume of orders for this class of material does not show it. Shipments are being made right along, it is true, but there is no volume to the demand. A leading producer reports that orders for the first three months of this year maintained an even pace or about a million and a half feet of stranded wire shipped from New York City territory, though only about one-quarter of this was for construction work. One of the large manufacturers in this field has been out of the market altogether for the past six months, the inference being lack of buying activity.

Stocks of the finished product are large at factories, and immediate shipment can be made on common sizes. Prices on stranded steel wire declined recently in view of the drop in steel quotations. The reduction, it is reported, amounted to 10 to 15 per cent, or expressed in exact figures, $5 per ton with a representative producer.

$225,000 Loss in Pacific Electric Railway Fire

Fire of mysterious origin on April 20 completely destroyed the Pacific Electric Railway's divisional carhouse and shops at Redondo Beach, Cal., with an accompanying loss of $225,000. Besides the complete loss of the combination one-story brick structure serving as carhouse and shops, which covered half a city block, rolling stock consisting of seven of the company's heavy-type interurban cars, one city-type car, one line car, one electric freight locomotive, one box car, one flat car and one steel flat car was entirely destroyed. Several other cars were damaged; though the prompt removal of gasoline tank cars stored near by prevented more serious loss. The fire also destroyed a vast quantity of expensive repair material stored at the shops. Of the total loss sustained $150,000 was covered by insurance.

Electrification in Zanzibar

Along with extensive improvements to Zanzibar Harbor, extending over the next three years, one of the projects mentioned is a narrow-gage electric railway to run the length of the island, according to Guaranty Trust Company.

Standardization Being Discussed by Gear Manufacturers

The fifth annual meeting of the American Gear Manufacturers' Association is being held in the Hotel Sinton, Cincinnati, Ohio, April 27, 28, 29 and 30. Standardization and uniform cost accounting will be among the subjects discussed, and important action is expected by the association tending toward the establishment of a more complete standardization of the products of the gear industry.

According to the program that has been prepared G. M. Bartlett of the Diamond Chain & Manufacturing Company will discuss "The Ideal Chain and Sprocket Drive"; A. R. Mitchell of the Andrews Steel Company will speak on "Industrial Gears from the User's Standpoint"; J. B. Foote, president Foote Brothers' Gear & Machine Company, has been assigned "Worm Gearing," and J. B. Doan, president American Tool Works, has an unannounced subject.

Thirty-Mile Line Projected in China

According to the Guaranty Trust Company an electric railway line from Siangtan to Changsha, China, a distance of 30 miles, is under consideration. Plans include the possible purchase of fifteen cars.

Rolling Stock

Southern Pacific Company is expecting delivery of twelve new passenger coaches about May 12 to be placed in service on the Portland-Corvallis division about the middle of July. The cost of the cars, it is stated, is $37,000 each. The new equipment will provide surplus cars for emergency operation and to take care of excursion travel.

Detroit (Mich.) Municipal Railway, mentioned in last week's issue as placing an order for twenty-five safety cars, has issued the following information and specifications on these cars:

Number of cars ordered	25
Date of order	April 15, 1921
Date of delivery	June 16, 1921
Builder	Osgood-Bradley Car Company
Type	18 ft. safety
Weight, total	16,800 lb.
Interior trim	Cherry
Air brakes	Westinghouse DH-16
Bumpers	O. H. 6-in. rolled channel section
Car signal system	Faraday
Car trimmings	Statuary Bronze
Control	K-63
Curtain fixtures	Curtain Supply Company
Curtain material	O'Bannon double-coated, diced
Designation signs	Keystone, glass back
Door operating mechanism	Safety Car Devices Company
Heater equipment	Cutler-Hammer, truss plank
Headlights	Golden Glow, HDB-96
Lightning arresters	Westinghouse
Motors	Westinghouse, 508
Paint	Sherwin-Williams, Old Dutch, oil enamel
Registers	International, type R-10
Sanders	Osgood-Bradley
Sash fixtures	J. L. Howard & Company
Seats	Reversible slat, cherry
Step treads	Feralun
Tail lights	Nichols-Lintern Duplex indicating
Trolley catchers or retrievers	Ohio Brass
Trolley base	Ohio Brass, form No. 1
Trucks	Osgood-Bradley, 25-96

Track and Roadway

Los Angeles, Cal.—Construction of a tunnel to relieve the downtown congestion of Los Angeles, Cal., has been started and will have a considerable effect on street car travel. The bore is known as the Second Street tunnel and will run from Hill to Figueroa Streets, a distance of 1,502 ft. Car tracks have been removed from Second Street.

Detroit (Mich.) Municipal Railway.—Contract for furnishing 11,200 tons of steel rails and special work for the Detroit Municipal Railway has been awarded to the Lorain Steel Company, the only bidder on the entire equipment for which bids were recently opened. The excavation work and construction under way and contemplated by the commission are being rushed.

St. Paul City Railway, Minneapolis, Minn.—The St. Paul City Railway is to begin its 1921 paving program between the tracks at once. This proposal was accepted by the City Council. This is a matter that has been held in abeyance for a long time owing to the company's inalibity to finance the work, and even now the money will be taken from sums laid aside for other purposes. This will provide for a beginning until other funds are available.

Fort Worth, Texas.—The City of Fort Worth, Texas, has made a guarantee to the Federal Government that a car line will be built and put in operation to Lake Worth, the city resort about nine miles northwest of the city. This pledge was made to comply with one of the conditions incident to the selection of the proffered site at Lake Worth for the Soldiers' Rehabilitation Hospital to be built by the Government.

Oil Fields Electric Railway, Eastland, Tex.—An extensive system of interurban electric railways is to be built in this part of the State by the Oil Fields Electric Railway, being organized by W. Y. Fleming and associates. Preliminary surveys have been made for a line to run from Fort Worth to Cisco, through Graham, Breckenridge and other towns. Another line is to run from Wichita Falls to Abilene, through Stephenville and Brownwood. A branch line will run from Caddo to Ranger, thence through Eastland to Cisco. From Ranger a branch line will be built to Desdemona. From Cisco, lines will go to Hilburn, Rusing Star, May and on to Brownwood. Another line from Cisco will run through Putnam and Baird to Abilene. From Caddo a main line will be run to Breckenridge and will branch off to Eliasville, through Ivan, from Eliasville to Graham and from Graham to Loving, Archer City to Wichita Falls. The principal office of the company will be at Eastland.

Olympia Light & Power Company, Olympia, Wash.—The Olympia Light & Power Company expects to replace three miles of plate joints with continuous rail joints on the present 40-lb. rail.

Seattle (Wash.) Municipal Street Railway.—The utilities committee of the City Council has made a tentative decision to recommend several extensions of the Seattle Municipal Street Railway, and D. W. Henderson, superintendent, has been asked to submit new estimates on the cost of extending the Beacon Hill line to Chicago Avenue, the Alki line and the Fifteenth Avenue and Cowen Park lines. It is the intention of the committee, if favorable action is decided upon, to recommend the sale of utility bonds, and if the bonds are not readily disposed of, to give residents of the district served an opportunity to subscribe to the issues.

Willapa Electric Company, Raymond, Wash.—The Superior Court of Thurston County on March 31 reviewed the order of the Public Service Commission of Washington, requiring the Willapa Electric Company to construct and maintain an extension of its railway. On April 4 the court ordered that the order of the commission be set aside. The requirement of the commission that the railway build certain extensions was referred to in the ELECTRIC RAILWAY JOURNAL for March 5, page 474.

Power Houses, Shops and Buildings

Berlin (N. H.) Street Railway.—The Berlin Street Railway within the next month will build a new carhouse.

Charleston Interurban Railway, Charleston, W. Va.—The Charleston Interurban Railway has purchased nearly an entire block of city property and is planning the erection of a modern terminal. T. S. Clark, attorney for the company, states that the company has outgrown its present station and that the new improvement will tend to eliminate a lot of congestion which prevails under the present system of operating cars.

Cincinnati (Ohio) Traction Company.—Bids for electrical equipment of substations which will be built by the Cincinnati (Ohio) Traction Company, before the contract for power with the Union Gas & Electric Company becomes effective were submitted to the office of the Director of Street Railways, recently for approval. The Westinghouse Electric Company bid $380,000 while the General Electric Company asked $409,925. It is planned to have the substations ready for operation on Sept. 1. There will be seven substations—Price Hill, Norwood, Hartwell, Chester Park, Cumminsville, Depot Street and Twelfth and Walnut Streets.

Professional Note

The Harry M. Hope Engineering Company, Boston, Mass., has established offices in the Dominion Express Building, Montreal, to handle its Canadian business. George W. Saunders, formerly with S. Pearson & Sons, London, is Canadian manager.

Trade Notes

The Rome Wire Company, Rome, N. Y., has added weatherproof wire to its manufacturing schedule, and its new weatherproof wire mill is now completed and in operation.

The Green Fuel Economizer Company about May 1 will move its general sales office and engineering department from 90 West Street, New York City, to the factory at Beacon, N. Y. The New York sales office will remain at 90 West Street, and Mr. Brinkerhoff will continue in charge.

The Esterline Company, Indianapolis, manufacturer of graphic recording instruments, announces the appointment of Walter W. Gaskill, 141 Milk Street, Boston, as New England representative of the company.

The Stoker Manufacturers' Association, J. G. Worker secretary, Phoenix Manufacturing Company, Eau Claire, Wis., has changed the date of its annual meeting to June 14, 15 and 16 at the Red Lion Inn, Stockbridge, Mass.

The Batterman-Truitt Company, 736-8 West Monroe Street, Chicago, has negotiated a lease covering additional floors in the Gordon Building, 730-38 West Monroe Street, tripling its facilities and equipment for the manufacture of ventilating fans and blowers.

Morton Manufacturing Company, Chicago, Ill., announces the appointment of Frank N. Grigg as southeastern sales manager, with offices at 630 Louisiana Ave., Washington, D. C., to handle the sale of the company's entire "Acme Line" of railway appliances. C. H. Kadie, formerly master mechanic of the Southern Railway, is associated with Mr. Grigg as sales representative.

American Di-Electrics, Ltd., New York City, manufacturers and engineers in the field of insulation, are moving to larger quarters at 71-73 West Broadway on May 1. John P. Rockwood, metropolitan distributer, is also moving to the same address. The change will enable the company to enlarge its lines and deal in all kinds of insulation in addition to those produced in its own factories. The company's Pittsburgh agent, the Electrical Engineering & Manufacturing Company, has also recently moved to larger quarters at 907-909 Penn Avenue, Pittsburgh.

Sanford Riley Stoker Company, Worcester, Mass., announces that the sales management for Riley underfeed stokers and Murphy furnaces has been concentrated under one head. William Pestell, formerly Western sales manager with headquarters at Chicago, now becomes sales manager with headquarters at 1226 Woolworth Building, New York City. W. L. Bigelow becomes district manager of the Pittsburgh territory, while C. Lincoln Smith goes to Cincinnati in the same capacity. To serve better the territory in and around Kansas City, the F. M. Beeson Machinery Company, 308 Mutual Building, Kansas City, has been appointed sales agent for both Riley stokers and Murphy furnaces. Sales in Denver territory will be handled by the Stearns-Roger Manufacturing Company, 1718 California Street, Denver. The Boston, Buffalo, Cleveland, Detroit, Chicago, and St. Paul offices remain unchanged.

New Advertising Literature

Pumps.—"Ten Years' Progress in Water Works Pumps" is a 100-page publication of the De Laval Steam Turbine Company, Trenton, N. J.

Stokers. — The Files Engineering Company, Inc., Providence, R. I., is distributing a sixteen-page booklet covering its hand-operated Files stokers.

Bond Welder.—The Ohio Brass Company, Mansfield, Ohio, as general distributer, is circulating a folder on the Wilson Plastic-Arc Rail Bond Welder.

Steam Turbines. — General Electric Company, Schenectady, N. Y., has issued bulletin No. 42,201-B, superseding No. 42,201-A, on Curtis steam turbines of 100-kw. to 3,500-kw. capacity.

Outdoor Switching. — "The Skeet Switch and Skeet Transformer Station," an eighteen-page publication has been issued by T. J. Johnson, Jr., Electric and Gas Building, Atlanta, Ga.

Hydraulic Valves.—Bulletin No. 52 has been issued by the Wellman-Seaver-Morgan Company, Cleveland, entitled "The W-S-M Balanced Plunger Hydraulic Valve," a new product developed by the company.

Wood Block Floors.—The Jennison-Wright Company, Toledo, Ohio, has issued a booklet describing and picturing installations of "Kreolite" wood flooring blocks for machine shops, car shops, loading platforms, roundhouses, etc.

Commercial Possibilities in Africa.—National Foreign Trade Council, Hanover Square, New York City, has issued for distribution a booklet dealing with the "Commercial Possibilities of the Union of South Africa."

Hammer Drill.—Chicago Pneumatic Tool Company, 6 East Forty-fourth Street, New York City, has issued bulletin 639, on its BQ-46 Hammer Drill which is primarily adapted for demolition work such as removing pavement along rails and between ties.

Foundry Practice.—The Farrell-Cheek Steel Foundry Company, Sandusky, Ohio, has just issued a complete handbook on foundry practice which describes and illustrates each operation required in making a casting, the same casting or pattern being used throughout.

Fire Fighting and Safety Devices.—American-La France Fire Engine Company, Inc., Elmira, N. Y., manufacturer of fire-fighting equipment and safety devices, has issued edition No. 6 of its 205-page catalog on "Fire-Fighting Equipment, Accessories and Supplies," and also edition D of its catalog specifically devoted to safety devices.

Why your Safety Cars should have The Peacock Staffless Brake

The Peacock Staffless

is powerful but simple

There is nothing complicated about the Peacock Staffless Brake. There are no bevel gears — no staff. All the moving parts are above the floor and are housed in a pressed steel case that projects into the vestibule from the dash only 3¼ in. And for the same ***human*** power, the Peacock Staffless develops ***three times the brake power*** of the ordinary handbrake — ***yet weighs less*** and costs very little, if any more, money.

NATIONAL BRAKE CO.

890 Ellicott Square
Buffalo, N. Y.

The Dozen Peacock Reasons

1. Saves half the space of the ordinary hand brake.
2. Weighs ***less.***
3. Gives three times the braking power for the same human power.
4. Operates without binding — no staff — no bevel gears.
5. Simple in construction.
6. All operating parts above floor.
7. Invariably sure and certain in operation.
8. Insures exactly the braking power needed for any size car.
9. Graduated stops and starts.
10. Housing protects working parts from dust, dirt, rain, snow.
11. Lower maintenance costs.
12. Greatest economy in the long run.

Each advantage will be dealt with in future advertisements — or you may secure the whole story in full in Bulletin No. 10. A copy ?

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More revenue from *more* riders
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Management, Organization and Cost Control
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Unit Power Plants insure low power costs
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Thermit Insert Rail Welding at Beaver Falls, Pa.—
Tapping the liquid Thermit steel into the mold

The Elimination of the Rail Joint is the Goal for Which All Engineers Have Striven

Track is seldom relaid because of worn out rail, but because of the condition of the joints. By eliminating the rail joint, the full life of the rail is assured or over about 30% more than otherwise obtained. In other words, a street rail lasting fifteen years will have its life prolonged to about twenty years by the elimination of the joint.

THERMIT INSERT WELDING

Is the only method by which the rail joint is actually and completely eliminated, yet without changing the physical qualities of the bearing surface or head of the rail. The insert provides a continuous rolled steel tread for the car wheel.

The 100% efficiency of the electrical conductivity of the Thermit Insert Rail Weld is another fact that effects a decided saving in installation and maintenance. No bonds whatever are installed and no maintenance required.

In welding your rails by the Thermit Insert method, you completely eliminate the joint and thus eliminate maintenance. A truly continuous rail is secured.

Let us know the section number of the rail which you wish to weld so that we can ship welding material suitable for the purpose. On receipt of an order for material and apparatus, we will send an expert demonstrator to instruct your men so that you can carry on this work yourselves.

Thermit Insert Weld installed in street.
No more joint troubles!

* * *

Send for our latest Rail Welding Pamphlet No. 3932

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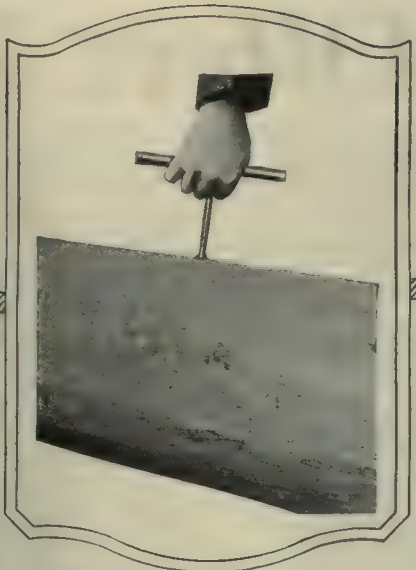

Actual Test of P&H Guaranteed Penetration
Process poles before shipment.
See plug below.

Best by Test

A SIMPLE TEST of poles treated by the P&H Guaranteed Penetration Process will prove conclusively our guarantee.

Test the poles treated by our process—prove to yourself that you are getting the full penetration. The more rigid the test, the better satisfied you will be.

Remember our guarantee is your safeguard. We urge you to test P & H Guaranteed Penetration Process poles.

Your interests will be safeguarded by demanding P&H Guaranteed Penetration Process poles. Don't be satisfied with any other.

P & H Guaranteed Penetration Process is the original guaranteed process and is produced only by the Page & Hill Co.

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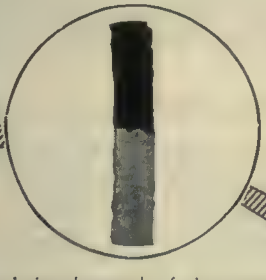


Actual size photograph of plug removed from the guaranteed area of the pole shown above.

Originators of the P & H Guaranteed Penetration Process. Producers, manufacturers, and foremost in the Butt-Treatment of Cedar Poles.

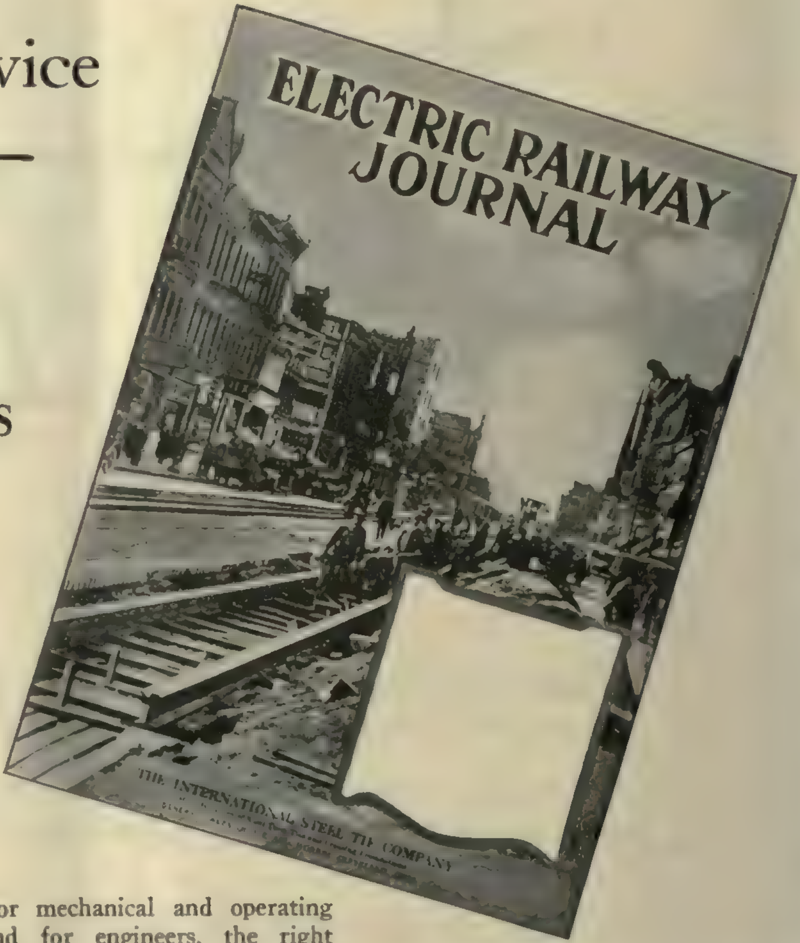
This disc countersunk on the butt-end of every pole Butt-Treated by the P & H Guaranteed Penetration Process is your assurance of one-half inch penetration. →

Butt-Treated
BY
PAGE & HILL CO.
1921
GUARANTEED
One-Half Inch
PENETRATION

A Timely Offer

2 Months' Service FREE—

The next 8 issues without cost to new subscribers



ELECTRIC railways need ideas now more than ever before. They need the brains of men who know how to cut costs, how to improve operating conditions, how, in short, to enable the electrical railway business more quickly to take advantage of the bright future that is dawning.

You have the same chance as the next man to supply those brains, to create those success-building ideas, if you keep yourself well informed about the ever-changing practices of the entire railway field.

But where can you meet men from other cities and other roads for a resultful exchange of experiences, how can you check up your methods with those used elsewhere, without spending a great deal of time and money?

The Answer

ELECTRIC Railway Journal full supplies the answer to that question. For 40 years it has been bringing to electric railway men that kind of information, quickly, thoroughly and accurately.

Its editorial service is well balanced. The right amount of technical matter, the right amount of departmental "kinks" and systems for busy executives, for mechanical and operating men and for engineers, the right amount of news, of notes on new equipment and material, and authoritative expressions of opinions on the fundamental principles and practices of the industry make Electric Railway Journal the right business paper for railway men who wish to be well informed and prepared for advancement.

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BECAUSE we believe so thoroughly in the idea that Electric Railway Journal can help you to further advancement we are making this timely offer to non-subscribers.

Send in your subscription order today, and we will send you the next eight issues (May 7-June 25) Absolutely Free, entering your paid subscription to begin with the issue of July 2, the first number of our next volume.

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Subscription rates: $4 *a year, add for zone postage west of the Mississippi* 50c. *In Canada*, $5.50.

Shocks-Impacts

Blows that are measured in thousands of tons, are taken daily, hourly for years by the friction draft gear on freight cars.

Resiliency makes it possible. The heavy draft gear springs that yield under the impact and take up the blow, have a parallel in the springs on a Condit D-17 Oil Circuit Breaker.

They take up the tremendous mechanical shock that occurs when an oil circuit breaker ruptures high power under short circuit conditions. Let us explain.

CONDIT ELECTRICAL MFG. CO.
South Boston 27, Mass.
Manufacturers of Electrical Protective Devices

D-17 Oil Circuit Breaker

Specifications: 1, 2, 3 and 4 pole; cell mounting manually or electrically operated; 500, 800 and 1200 amperes at 15,000 Volts; 500 and 800 amperes at 25,000 Volts.

122-14

CONDIT

THE BABCOCK & WILCOX CO.

85 LIBERTY ST., NEW YORK

The Babcock & Wilcox Co. is constantly endeavoring to improve the design, construction and operating qualities of its products. The Company believes in being conservative and in refraining from making changes until absolutely satisfied that its developments are sound from engineering, construction and operating viewpoints.

THE STIRLING BOILER

REDESIGNED, RECLASSIFIED, PATENTED

During the last fifteen years numerous changes have been made in the Stirling Boiler. In some instances these have been to meet special and unusual operating conditions, and others have been the result of improvements in details of design and construction. These changes have been carefully watched and proven under various and difficult conditions of operation. The advantages of many of them in service have been so marked that after years of experience and study these features have been incorporated in the redesigned Stirling Boiler.

The studies which have led to redesign have also led to a consideration of the variation between classes and sizes of Stirling Boilers. This has resulted in a reclassification of these boilers in which the variation between classes and sizes is simple, logical and progressive.

The redesigned and reclassified Stirling Boiler is now offered.

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Los Angeles, 404-406 Central Building
Seattle, L. C. Smith Building
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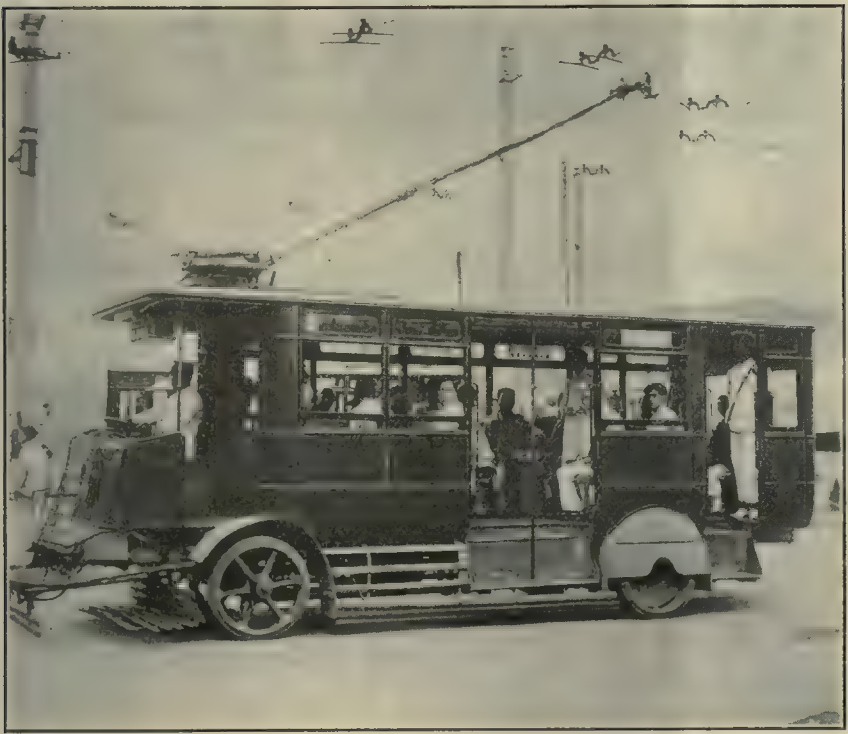
Houston, Texas, Southern Pacific Building
San Juan, Porto Rico, Royal Bank Building
Honolulu, H. I., Castle & Cooke Building

H-B LIFE GUARDS



A snapshot of one of Shanghai's trackless trolley cars taking a short sharp curve. This car is up to the minute in all details. There are two trolley wires for each car. The pole is built to enable the driver to swerve a few inches out of the exact line he is expected to follow. There is a double door and a single, and there is never any occassion for discomfort in boarding or alighting from the car. Do not overlook the division of the car into first-class and second-class sections. The large room in front is for first-class passengers and the rear is for second-class.

FOR THE RAILLESS TROLLEY BUSSES IN SHANGHAI, CHINA

The Front-End Protection for Railless Trolley cars or for busses is equally as important as for safety cars or for heavy cars has been proven by Mr. David McCole, General Manager, of the Shanghai Electric Construction Company, Ltd., which operates the tramways in the International Settlement in Shanghai.

Although this company also operates ninety motor trolley cars and seventy trailers, these speedy railless trolley busses are used in the most congested district of the city instead of being used as feeders.

Which backs up our contention that H-B Life Guards are just what you want for close schedule service on crowded city streets regardless of the kind of equipment employed.

The H-B Life Guard is the one device that never fails to operate and never fails to protect the patron. It is quick as a flash. The cost is insignificant.

But most important of all it saves human lives.

Years of constant service on heavy cars in every nook and corner of the world is largely responsible for its being accepted as the best front end protection for any kind of a car.

The Consolidated Car Fender Co.
Providence, R. I.

General Sales Agent
Wendell & MacDuffie Co.
61 Broadway, New York

"STANDARD"

Steel Tires
Steel Tired Wheels
Solid Rolled Steel Wheels
O. H. Steel and Malleable Iron Castings
Solid Forged Gear Blanks
Steel Forgings Iron Forgings
Forged and Rolled Steel
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"The 'Standard' Brand on your material is an assurance of eventual economy."

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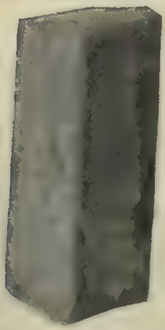
Fig. 1

Fig. 2

Fig. 3

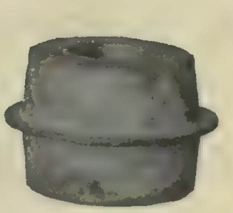
Fig. 4

Fig. 5

Nuttall's New Process of Drop-Forging Motor Pinion Blanks

The illustrations above show the various steps in forging Nuttall special drop-forged motor pinion blanks.

Figure 1—Section cut from square rolled billet.

Figure 2—Billet upset and rounded.

Figure 3—Blank rough forged—first forming operation in retaining die.

Figure 4—Blank finish forged—second forming operation in retaining die.

Figure 5—Blank sized and trimmed—ready for machining.

Result—Improved Basic Material.

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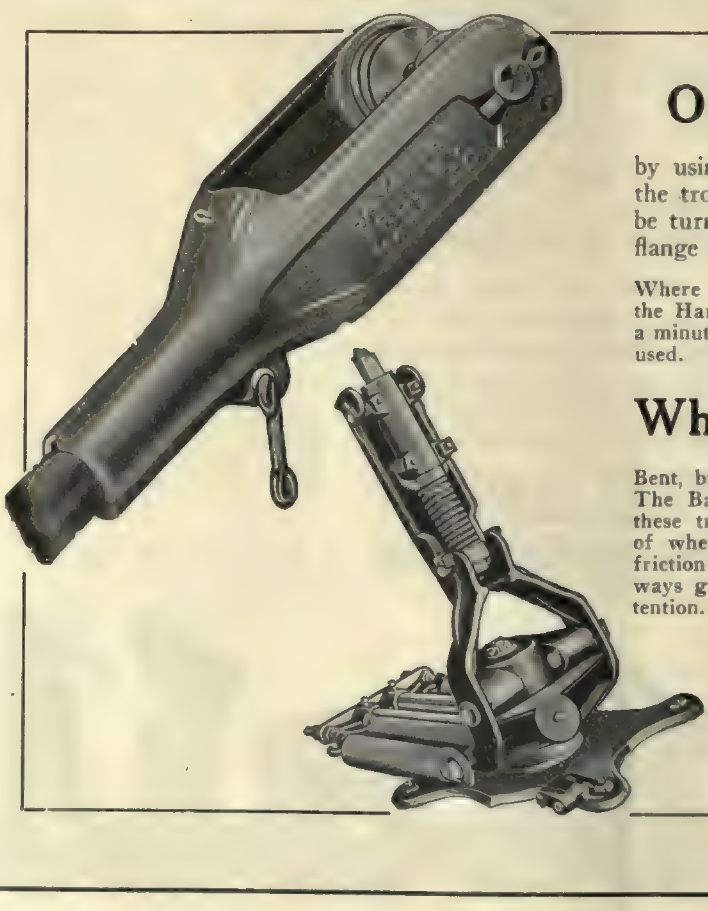

Overcome Side Wear

by using Bayonet Harps. Where curves cause the trouble on single cars, the Harp can simply be turned half way over which brings the other flange to the wire while rounding the curve.

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Carnegie Steel Company

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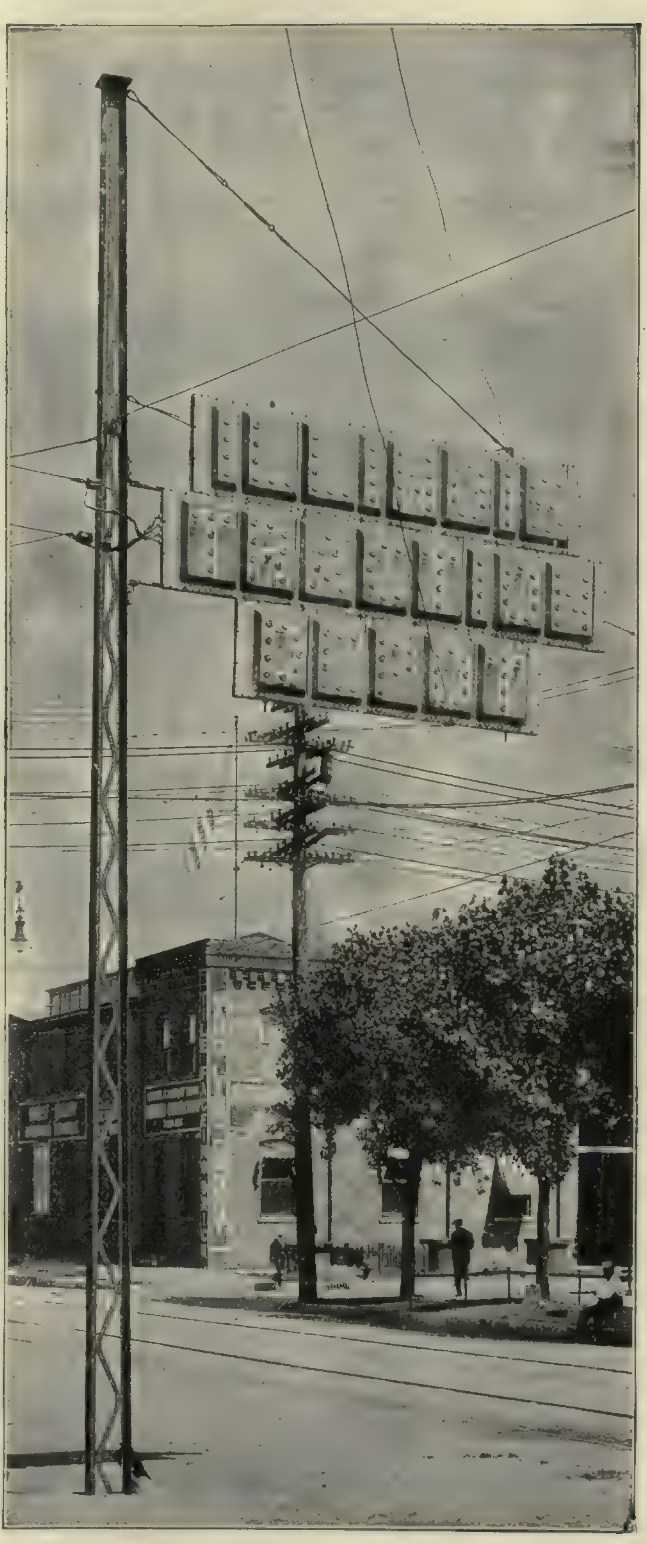

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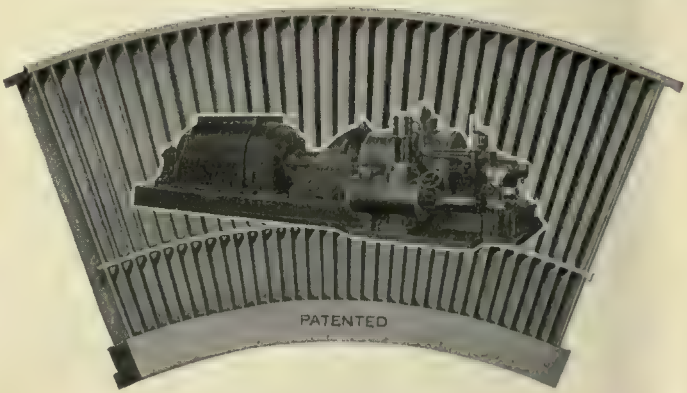

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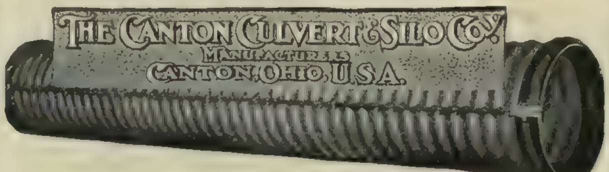

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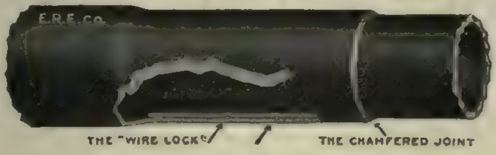

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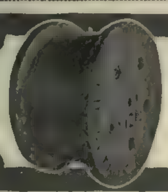

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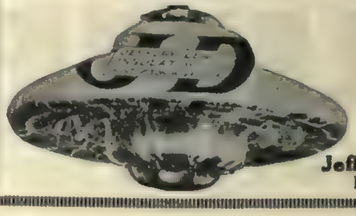

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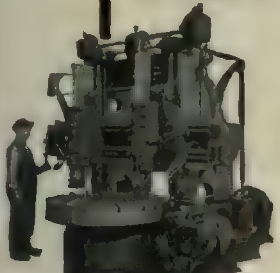

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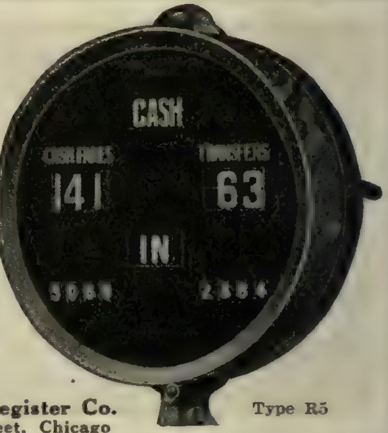

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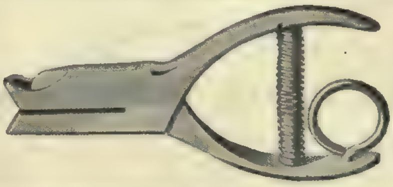

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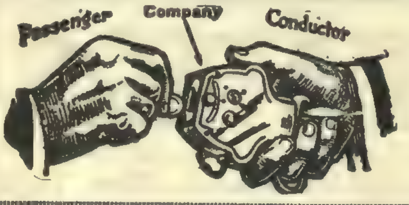

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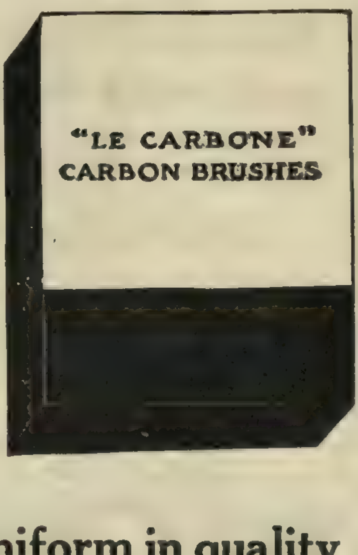

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Railway Motors

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133 So. 5th St., Philadelphia, Pa.

For 20 Years

we have been
Buying and Selling
Second-Hand Cars
Trucks and Motors
At Your Service

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

When Writing Copy

ALLOW FIVE WORDS for the address, if replies are to a box number in care of any of our offices. There is no extra charge for forwarding replies.

GIVE FULL INFORMATION in your advertisement—it is all the reader has to judge from.

TO SIGN YOUR NAME and address to your advertisement begets the confidence of the reader and facilitates receiving replies. You can, however, obviate delay in receiving answers by signing your ad. only with initials (your own or others), care of your home, your office or a post-office box number in your city.

In Replying to Ads

DO NOT ENCLOSE original testimonials or anything that you may want returned. State your experience and qualifications in as concise and neat a manner as possible and enclose *copies* of your testimonials.

BE CAREFUL TO PUT ON ENVELOPE, when answering any "blind" ad, the box number in the ad, the name of the paper, and also the local address of office to which reply is sent:

36th St. at 10th Ave.,	New York
935 Real Estate Trust Bldg.,	Philadelphia
533 Leader-News Bldg.,	Cleveland
1570 Old Colony Bldg.,	Chicago
501 Rialto Bldg.,	San Francisco

•151

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here's a buy!

This steel body and its equipment was purchased for electric switching locomotive but was never assembled. Will sell the entire equipment listed below for $9,500.00, F.O.B. Tacoma, Washington, or singly as follows:

1—Steel Body, Complete	$3500.00
1—4 Motor G. E. 55 Equipment with Type Control, Complete, (Except Gears)	6000.00
1—14 E.L. Double End Air Brake Equipment (Except 2-D 3 E G Compressors, 1-J8 Governor—2-20½ x 42 Reservoir	500.00
3—A E R A—Standard Type E. C. Axles with 6-37 in. Rolled Steel Wheels, 3½ in. Thread, ⅞ in. Flange	460.00
2—Extra 37 in. Wheels as above	100.00
3—60 Tooth Gears 6-15/16 in. bore, 5⅜ in. face, 2½ pitch, mounted on above axles	120.00
2—Gears as above	80.00
3—Extra 17 Tooth Pinions, 5-⅜ in. face, 2½ pitch	40.00
Total	$10,800.00

For information write G. O. Snider, Purchasing Agent,
Tacoma Railway & Power Co., Tacoma, Washington

RAILS RAILS RAILS

FOR SALE

500 tons 7 in. Tram-Head Rail; Bethlehem Steel Co. Section No. 238; in 30 ft. lengths. Joints to match.

Rails equal to new. Ready for instant shipment.

Karasik, Friedman & Co., Inc., Woolworth Bldg., New York

WE'VE GOT 'EM!

No. 1 Relaying Rails and Angle Bars for Immediate Shipment

**30 lb., 40 lb., 50 lb., 56 lb., 60 lb.,
68 lb., 70 lb., 80 lb., 90 lb.**

WRITE OR WIRE FOR QUOTATIONS STATING TONNAGE and DESTINATION

NEW—80-LB. RAIL and ACCESSORIES A. R. A. "TYPE B" RAIL
Approximately 30,000 gross tons—Standard Lengths—Stored at Kearney, N. J.

HYMAN-MICHAELS COMPANY
NEW and RELAYING RAILS
Peoples Gas Building, Chicago, Illinois

New York Office:
1324-1326 Woolworth Bldg.

Pittsburgh Office:
1312 First National Bank Bldg.

St. Louis Office:
2115 Railway Exchange Bldg.

We buy electric and steam railways that are to be dismantled

Surplus Stocks Are Easily Disposed of *Through the*

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"FOR SALE" announcements are carefully read by the trade.

"SEARCHLIGHT" Ads bring prompt and profitable returns.

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In Stock
for
Immediate Shipment

Turbo Units, Rotary Converters, Transformers, Motor Generator Sets, Dynamos and Motors

ARCHER & BALDWIN, Inc.
114-118 Liberty St., New York City
Tel.: 4337-8 Rector

If there is anything you want—

or something you don't want that *other* readers of this paper can supply—or use—advertise in the

Searchlight Section

NOW— is the time to offer good second-hand equipment or machinery for sale. The demand is great for good plant for immediate delivery. That's why you should advertise NOW.

NOW— or any other time, use the Searchlight Section for advertising

Agencies Wanted
Agents Wanted
Auction Notices
Buildings For Sale
Business Opportunities
Civil Service Opportunities
Contracts To Be Let
Contracts Wanted
Educational Courses
Employment Agencies
Exchanges
For Rent Items
Franchises
Industrial Sites
Miscellaneous Wants
New Industries Wanted
Partners Wanted
Patents For Sale
Patent Attorneys
Plants For Sale
Positions Vacant
Positions Wanted
Property For Sale
Receivers' Sales
Representatives Wanted
Salesmen Wanted
Work Wanted
Etc., Etc., Etc.

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WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Acetylene Service and Apparatus
Oxweld Acetylene Co.

Advertising, Street Car
Collier, Inc., Barron G.

Air Aftercoolers
Ingersoll-Rand Co.

Air Circuit Breakers
Condit Electrical Mfg. Co.

Air Receivers
Ingersoll-Rand Co.

Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Angle Bars
Lackawanna Steel Co.

Automobiles and Buses
Brill Co., The J. G.

Axles
Bemis Car Truck Co.
Carnegie Steel Co.
St. Louis Car Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Standard Steel Works Co.
Westinghouse Elec. & Mfg. Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Babbitt Metal
Ajax Metal Co.
More-Jones Brass & Metal Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

Batteries, Dry
National Carbon Co., Inc.

Batteries, Storage
Electric Storage Battery Co.

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
St. Louis Car Co.
Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bearings, Oilless, Graphite, Bronze and Wood
Bound Brook Oil-less Bearing Co.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail
Niles-Bement-Pond Co.

Boilers
Babcock & Wilcox Co.

Boiler Tubes
National Tube Co.

Bond Testers
American Steel & Wire Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Ry. Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.
Oxweld Acetylene Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Ry. Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
National Ry. Appliance Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Johns-Manville, Inc.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Traction Brake Co.

Bridges and Buildings
American Bridge Co.

Brooms, Track, Steel or Rattan
Zelnicker, W. A., Supply Co., Inc.

Brushes, Carbon
Corliss Carbon Co.
General Electric Co.
Jeandron, W. J.
National Carbon Co., Inc.
United States Graphite Co.
Westinghouse Elec. & Mfg. Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Brushes, Graphite
National Carbon Co., Inc.

Bunkers, Coal
American Bridge Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.

Bushings, Graphite and Wooden
Bound Brook Oil-less Bearing Co.

Cables (See Wires and Cables)

Carbon Brushes (See Brushes, Carbon)

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
Electric Storage Battery Co.
General Electric Co.

Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

Castings, Gray Iron and Steel
American Bridge Co.
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
St. Louis Car Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Ackley Brake & Supply Corp.
Electric Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Ceiling, Car
Pantasote Co.

Change Carriers
Galef. J. L.

Circuit Breakers
Cutter Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Comstock Mfg. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Comstock Mfg. Co.
General Electric Co.
Rome Wire Co.
Westinghouse Elec. & Mfg. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Coin-Counting Machines
Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Traction Brake Co.

Compressors, Gas
Ingersoll-Rand Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

Conduit Fittings
Chicago Fuse Mfg. Co.

Conduits, Underground
Johns-Manville, Inc.

Connectors, Solderless
Frankel Connector Co.
Westinghouse Elec. & Mfg. Co.

Controller Fingers
Russell Mfg. Co.

Controllers or Parts
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Controller Regulators
Electric Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
Allison & Co., J. E.

Conveying and Hoisting Machinery
American Bridge Co.
Columbia M. W. & M. I. Co.

Copper Wire
Anaconda Copper Mining Co.
Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roebling's Sons Co., John A.
Samson Cordage Works

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Traction Brake Co.

Cranes
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing Signals (See Signals, Crossing)

Crossings, Frog and Switch
Wharton, Jr., & Co., Wm.

Crossings, Track (See Track, Special Work)

Crushers, Rock
Allis-Chalmers Mfg. Co.

Culverts
Canton Culvert & Silo Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Electric Service Supplies Co.
Pantasote Co.
St. Louis Car Co.

Cutouts
Chicago Fuse Mfg. Co.
Johns-Manville, Inc.

Cutting Apparatus, Oxy-Acetylene
Oxweld Acetylene Co.

Dealers' Machinery
Archer & Baldwin
Cleveland Armature Works
Electric Equipment Co.
Foster Co., H. M.
Hyman Michaels Co.
Karasik, Friedman & Co., Inc.
Reading Engineering Co.
Transit Equipt. Co.

Derailing Devices (See also Track Work)
Wharton Jr., & Co., Wm.

Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Detective Service
Wish Service, P. Edward

Dogs, Lathe
Williams & Co., J. H.

Door Operating Devices
Consolidated Car Heating Co.
National Pneumatic Co., Inc.
Safety Car Devices Co.

Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc.

Draft Rigging (See Couplers)

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Niles-Bement-Pond Co.
Ohio Brass Co.

Dryers, Sand
Electric Service Supplies Co.
Zelnicker Supply Co., Inc., Walter A.

Electrically Operated Switches (Air or Oil)
Condit Electrical Mfg. Co.

Electrical Wires and Cables
American Electrical Works
American Steel & Wire Co.
Roebling's Sons Co., J. A.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. E.
Archbold-Brady Co.
Arnold Co., The
Beeler, John
Clark & Co., Mgr., Corp., E. W.
Day & Zimmermann
Feustel, Robert M.
Ford, Bacon & Davis
Gould, L. E.
Hemphill & Wells
Holst, Englehardt W.
Horton, Barker & Wheeler
Jacobs & Co., J. L.
Jackson, Walter
Parsons, Klapp, Brinkerhoff & Douglas
Republic Engineers, Inc.
Richey, Albert S.
Sanderson & Porter
Stone & Webster
White Engineering Corp., The J. G.

Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

Fare Boxes
Cleveland Fare Box Co.
Economy Electric Devices Co.
Johnson Fare Box Co.
National Railway Appliance Co.

Feed Water Heating
Schutte & Koerting Co.

Brake Shoes

A. E. R. A. Standards

Diamond "S" Steel Back is the Best Type

Standard Patterns for

SAFETY CAR

D-67 for Narrow Treads
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30 Church Street, New York
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Exide
BATTERIES

For Testing in Electrical Repair Shop

The EXIDE Portable Battery is used, and a special battery of this type has been designed for high discharge rates.

THE ELECTRIC STORAGE BATTERY CO.

Oldest and largest manufacturers in the world of storage batteries for every purpose

1888 **Philadelphia** 1921

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RAILWAY SUPPLIES

- Tool Steel Gears and Pinions
- Anderson Slack Adjusters
- Genesco Paint Oils
- Dunham Hopper Door Device
- Feasible Drop Brake Staffs
- Flaxlinum Insulation
- Anglo-American Varnishes, Paints, Enamels, Surfacers, Shop Cleaner
- Johnson Fare Boxes
- Drew Line Material and Railway Specialties
- Perry Side Bearings
- Miller Trolley Shoes
- Hartman Centering Center Plates
- Economy Power Saving Meter
- H & W Electric Heaters
- Garland Ventilators
- Pitt Sanders
- National Safety Car Equipment Co's One-Man Safety Cars

YOUR ROADBED

will be smoother and easier riding if tamped with "Imperial" Tie Tampers. Also, it will *stay* that way for a long time—an important item, especially where the ballast is overlaid with paving.

"Imperial" Tie Tampers save labor on this work, and they save labor on other jobs, for you can use them for tearing up any kind of pavement, cobble, asphalt or concrete.

The air furnished by the compressor may and should be used for bonding rails, tamping concrete, sandblasting, painting, and all the other useful ways that air can be applied.

The above shows a 2-tool "Imperial" Electric-Air Tie Tamping Outfit

You should have Bulletin 9132.
May we send it?

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11 Broadway, New York
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Offices the World Over

WHAT AND WHERE TO BUY

Fences, Woven Wire and Fence Posts
American Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.

Fibre and Fibre Tubing
Continental Fibre Co.
Johns-Manville, Inc.
Westinghouse Elec. & Mfg. Co.

Field Coils (See Coils)

Filters, Water
Scaife & Sons Co., Wm. B.

Fire Extinguishers
Johns-Manville, Inc.

Floodlights
Electric Service Supplies Co.

Flooring Composition
American Mason Safety Tread Co.
Johns-Manville, Inc.

Floor Plates
American Abrasive Metals Co.

Forgings
Carnegie Steel Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
Williams & Co., J. H.

Frogs, Track (See Track Work)

Funnel Castings
Wharton, Jr., & Co., Wm.

Fuses and Fuse Boxes
Columbia M. W. & M. I. Co.
General Electric Co.
Johns-Manville, Inc.
Westinghouse Elec. & Mfg. Co.
Williams & Co., J. H.

Fuses, Refillable
Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.

Gages, Oil and Water
Ohio Brass Co.

Gaskets
Johns-Manville, Inc.
Power Specialty Co.
Westinghouse Traction Brake Co.

Gas-Electric Cars
General Electric Co.

Gas Producers
Westinghouse Elec. & Mfg. Co.

Gates, Car
Brill Co., The J. G.

Gear Blanks
Carnegie Steel Co.
Standard Steel Works Co.

Gear Cases
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Westinghouse Elec. & Mfg. Co.

Gears and Pinions
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Gongs (See Bells and Gongs)

Grates, Chain
Green Eng. Co.

Greases (See Lubricants)

Grinders and Grinding Supplies
Metal & Thermit Corp.
Railway Track-work Co.

Grinding Blocks and Wheels
Railway Track-work Co.

Guards, Cattle
American Bridge Co.

Guards, Trolley
Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley
Anderson Mfg. Co., A. & J. M.
Bayonet Trolley Harp. Co.
Electric Service Supplies Co.
Nuttall Co., R. D.
Star Brass Works

Headlights
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

Headlining
Pantasote Co.

Heaters, Car (Electric)
Consolidated Car Heating Co.
Economy Electric Devices Co.
Gold Car Heating & Lighting Co.
National Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Cooper Heater Co.
Smith Heater Co., Peter

Heaters, Car (Stove)
Electric Service Supplies Co.
Smith Heater Co., Peter

Hoists and Lifts
Columbia M. W. & M. I. Co.
Ford-Chain Block Co.
Niles-Bement-Pond Co.

Hose
Ingersoll-Rand Co.

Hose, Bridges
Ohio Brass Co.

Hydraulic Machinery
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.

Injectors
Schutte & Koerting Co.

Inspection
Electrical Testing Lab's

Instruments, Measuring, Testing and Recording
Economy Electric Devices Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Insulating Cloth, Paper and Tape
General Electric Co.
Johns-Manville, Inc.
Westinghouse Elec. & Mfg. Co.

Insulating Materials, China & Porcelain
Jeffrey-Dewitt Insulator Co.

Insulation (See also Paints)
Anderson Mfg. Co., A. & J. M.
Electric Ry. Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville, Inc.
Westinghouse Elec. & Mfg. Co.

Insulators, China, Porcelain & Composition
Jeffrey-Dewitt Insulator Co.

Insulators (See also Line Material)
Anderson Mfg. Co., A. & J. M.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Flood City Mfg. Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Insulator Pins
Electric Service Supplies Co.
Hubbard & Co.

Jacks (See also Cranes, Hoists and Lifts)
Buckeye Jack Mfg. Co.
Columbia M. W. & M. I. Co.

Joints, Rail
Carnegie Steel Co.
Lackawanna Steel Co.
Zelnicker Supply Company, Inc., Walter A.

Journal Boxes
Bemis Car Truck Co.
Brill Co., The J. G.

Lamp Guards and Fixtures
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Arc and Incandescent (See also Headlights)
Anderson Mfg. Co., A. & J. M.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Signal and Marker
Ohio Brass Co.

Lathe Attachments
Williams & Co., J. H.

Lathes, Car Wheel
Niles-Bement-Pond Co.

Lightning Protection
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Anderson Mfg. Co., A. & J. M.
Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Hubbard & Co.
Johns-Manville, Inc.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Loaders, Wagon, Truck or Car
Portable Machinery Co.

Locking Spring Boxes
Wharton, Jr., & Co., Wm.

Locomotives, Electric
General Electric Co.
McGuire-Cummings Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Lubricating Engineers
Galena-Signal Oil Co.

Lubricants, Oil and Grease
Galena-Signal Oil Co.

Machine Tools
Columbia M. W. & M. I. Co.
Niles-Bement-Pond Co.

Machine Work
Columbia M. W. & M. I. Co.

Manganese Steel Castings
Wharton, Jr. & Co., Wm.

Manganese Steel Special Track Work
Wharton, Jr., & Co., Wm.

Meters, Car, Watt-Hour
Economy Electric Devices Co.

Meters (See Instruments)
Electric Service Suplies Co.

Money Changers
Galef, J. L.

Motormen's Seats
Brill Co., J. G., The
Electric Service Supplies Co.
Wood Co., Chas. N.

Motors, Electric
Allis-Chalmers Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Motors and Generators, Sets
General Electric Co.

Nuts and Bolts
Allis-Chalmers Mfg. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.
Lackawanna Steel Co.

Oil Burning Equipment
Schutte & Koerting Co.

Oil Circuit Breakers
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Pantasote Co.

How the strongest insulating base was developed

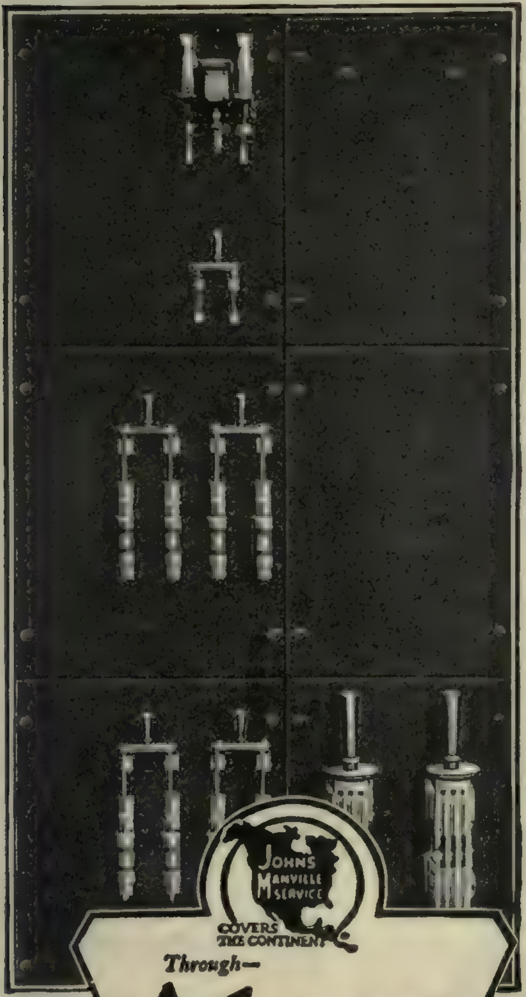
BACK in the old days of sixteen lamp arc light machines, when 30 K. W. dynamos were few and far between, the term "switch-board" was a correct descriptive title.

When switchboards grew on trees

For then electrical instruments were generally mounted on hardwood boards, hence the name. Occasionally from "unknown causes" these wooden boards caught fire, strange to say. But it wasn't long, however, until slate, soapstone and marble came into use—making the fire-proof switchboard a reality.

Quarried materials proved unsatisfactory

Unfortunately, high potentials and heavy currents with their attendant oil switches and massive circuit breakers quickly showed the need for greater mechanical strength and insulating properties than either slate, soapstone or marble possessed. These quarried materials, in addition to their lack of physical and dielectric strength, were often hygroscopic and generally contained fine metallic veins which permitted current leakage and ultimate disaster.



What an insulating base should be

So the progress in electrical development made necessary a fire-proof material of high, permanent insulating value, mechanically strong, easily worked, impervious to water and oil and of pleasing appearance.

Why Ebony Asbestos Wood is the strongest insulating base

Johns-Manville Ebony Asbestos Wood meets every one of these requirements. It is fire-proof, because it is made of asbestos fibres intimately mixed with extra high grade cement. It has a dielectric strength far greater than quarried materials. It is mechanically not only strong, but tough. It is non-hygroscopic; impervious to oil and water; is easily worked and resembles in appearance the best oiled slate.

There are absolutely no metallic veins in Ebony Asbestos Wood, due to the purity of its ingredients. Its high dielectric strength is largely the result of its thorough impregnation with special insulating compounds.

Transite, another form of Asbestos Wood

There is an unimpregnated form of Asbestos Wood called Transite. As a fire-proof structural material for electrical barriers, enclosures and oil switch compartments as well as for general paneling, partition and roofing work, Transite Asbestos Wood is unequalled for strength and durability. You will be interested in our booklet on Ebony and Transite Asbestos Wood. Send for it. The nearest Johns-Manville branch will gladly mail a copy without obligation on your part.

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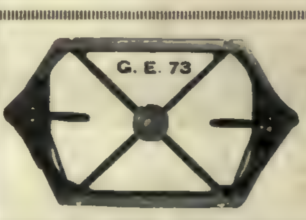

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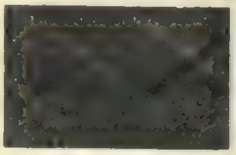
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- Armature buggies and stands
- Babbitting molds
- Banding and heading machines
- Car hoists
- Car replacers
- Coil taping machines for armature leads
- Coil winding machines
- Pinion pullers
- Pit jacks
- Signal or target switches
- Tension stands

CAR EQUIPMENT

- Armature and axle bearings
- Armature and field coils
- Bearings (axle and armature)
- Brush-holders and brush-holder springs
- Brake, door and other handles
- Brake forgings, rigging, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or malleable iron)
- Grid resisters
- Third-rail shoe beams and accessories
- Trolley poles (steel) and wheels

CAR AND TRUCK SUPPLIES

"Exhaust" Ventilator

The Brill "Exhaust" Ventilator conforms to every Board of Health requirement. It has sufficient capacity to remove the impure air from the carbody without subjecting the passengers to dangerous draughts. Its operation is automatic, being set in motion by the slightest movement of the outside air. There are no parts to get out of order, and maintenance is practically nothing.

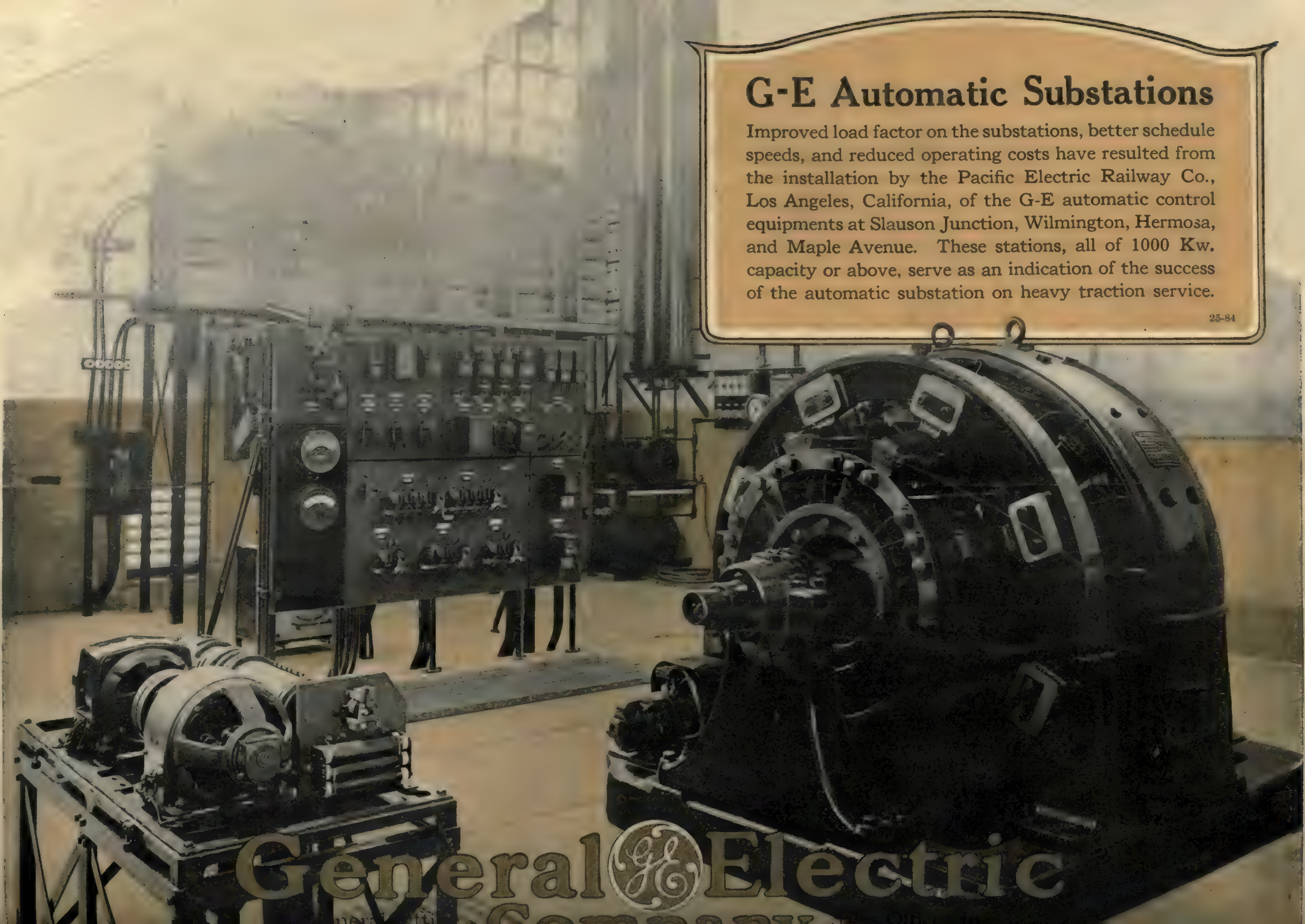
Besides performing its function proficiently, the neat and symmetrical appearance of the Brill "Exhaust" Ventilator has been responsible for the favorable impression it has made in general upon Electric Railway Officials.

Truck Springs

Springs of Brill Manufacture are made from high carbon, low phosphorous, open hearth steel, which meets the requirements of the American Society for Testing Materials Chemical Specifications (same as Pennsylvania Railroad Standard) and the American Society for Testing Materials Physical Specifications.

All springs are thoroughly tested for deflection before shipment with hydraulic testing machines and every precaution taken to maintain the high standard of durability and efficiency which has been responsible in a large measure for the success of Brill Trucks.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. — ST. LOUIS MO.
G. C. KUHLMAN CAR CO. — CLEVELAND, OHIO.
WASON MANF'G CO. SPRINGFIELD MASS.



G-E Automatic Substations

Improved load factor on the substations, better schedule speeds, and reduced operating costs have resulted from the installation by the Pacific Electric Railway Co., Los Angeles, California, of the G-E automatic control equipments at Slauson Junction, Wilmington, Hermosa, and Maple Avenue. These stations, all of 1000 Kw. capacity or above, serve as an indication of the success of the automatic substation on heavy traction service.

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